

# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices © 1977 by Computerworld, Inc.

Vol. XI, No. 47

November 21, 1977

75¢ a copy; \$18/year

## Earnings Up For DP Brass

By Molly Upton  
CW Staff

NEW YORK — Top systems and DP executives placed second only to top financial planning executives in the increase in total compensation received during 1976 compared with 1975, according to *Executive Compensation*, a book by the Financial Executives Institute here.

Top financial planners averaged a 13% increase in compensation, but hard on their heels came DP executives, with a 12.7% rise, followed by general accounting executives, who posted an 11.6% gain, according to the survey of nearly 1,200 companies. The average increase for the middle-management sector was 11.4% in 1976.

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## Work, Welfare Rolls Matched

## Privacy Backers Hit HEW Project

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — A federal program using computer technology to purge the nation's welfare roll of cheats could also undermine the privacy of individuals' records held by the government, privacy advocates here have warned.

Directed for the time being at federal employees, Project Match is a Department of Health, Education and Welfare (HEW) program designed to reduce welfare fraud and abuse by identifying and taking action against those employees who are illegally receiving funds from the Aid to Families With Dependent Children (AFDC) program.

An initial raw match of payroll and welfare records has found 26,334

HEW employees receiving both salaries and welfare funds. HEW Secretary Joseph A. Califano Jr. has pointed out, however, that many of these people — especially those with large families and those who hold lower paying jobs — receive such funds legally.

However, plans are in the works to match private sector employer records with the welfare rolls as well.

### 'File Cabinet Mentality'

Members of Congress and the Privacy Protection Study Commission are questioning the approach HEW is taking with Project Match. They fear that individuals' expectation of confidentiality for the records held by the U.S. will be sacrificed for efficiency and the department's determination to

prove that major social programs can be managed effectively.

David F. Linowes, former privacy commission chairman has called the extension of Project Match to private employer records "an abuse of personal privacy rights."

Califano exhibits "a file cabinet mentality" in his failure to recognize that "the biggest threat to personal privacy today is computer-to-computer linkage," Linowes charged.

Rep. Richardson Preyer (D-N.C.) has written to the Office of Management and Budget (OMB) asking that federal agency to clarify the Privacy Act and the Freedom of Information Act grounds on which agencies such as the Civil Service Commission and the Department of Defense have turned their personnel files over to HEW for Project Match.

For Califano and HEW's Office of the Inspector General, which handles Match, the issue is the need to improve "taxpayer confidence that federal funds are being spent wisely."

Processing on an IBM 370/168 at its headquarters here, HEW has completed the initial runs for 21 selected jurisdictions with high AFDC rolls and concentrations of federal employees. These jurisdictions include 18 states, New York City, the District of Columbia and the Norfolk and northern areas of Virginia; they represent 73% of all AFDC recipients and 68% of all federal civilian employees, Califano said.

Of the 26,334 raw matches HEW has found, 13,354 represent employees currently on the federal payroll; 12,980 have left government work

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## Compares to IBM 30 Series

## HIS Restructures Level 68 Line

By Frank Vaughan  
Don Leavitt  
And Ronald A. Frank  
CW Staff

PHOENIX — Honeywell Information Systems, Inc. has restructured its Level 68 large-scale line to offer what the firm claimed is performance ranging from 125% of the IBM 3031 to 125% of the 3033.

The Level 68/Distributed Processing System (68/DPS), which has four different levels of power — the fourth of which also offers dual- and triple-processor configurations — replaces the Level 68/60 and 68/80 models, in-

troduced in 1975 and 1974 respectively.

The 68/DPS Level 1 offers 25% greater performance than the IBM 3031 and 15% more than the HIS 68/-80, HIS said.

The 68/DPS Level 2 system outperforms the Level 1 by 55%, the Level 3 configuration outperforms the Level 1 by 235% and the Level 4 single-processor configuration outperforms the Level 1 by 325%, the firm claimed.

The Level 4 single processor's performance is said to be 90% of that of the 3033.

By adding a second processor to the

Level 4, users can gain 18% to 22% greater performance than that available on the single-processor Level 4, the firm claimed. Adding a third processor gives another 18% to 22% boost in power over the dual-process configuration, a spokesman explained.

However, the firm refused to give out cycle times, clock speeds, memory access times, throughput or benchmark data to support its performance claims, saying that information was proprietary.

The Level 68/DPS is a Multiplexed Information and Computing Service (Multics) system. Major characteristics of a Multics system, according to Datapro Research Corp., include "access to the system through remote terminals as the normal means of system access, multiprocessing with dynamic reconfiguration capabilities, a unique hardware-based ring structure that provides security for sharing of programs and data, a tree-structured hierarchy for organization of user and system storage and the availability of multiple programming environments and user interfaces within a single system."

No new Multics capabilities have been added, according to HIS. However, existing capabilities have been expanded, the spokesman said.

### Few Software Surprises

Despite a choice of words in its announcement that indicated major changes in the software available under Level 68/DPS, HIS appears to have very few surprises in this area. There are no new languages and programs written in Fortran, Basic or

(Continued on Page 4)

## U.S. Dragging Feet on Issue Of Transborder Data Flows

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — The U.S. is continuing to talk about "studying" transborder data flows while European governments are designing privacy legislation that will keep their information at home.

Direct U.S. participation in the writing of an international agreement regarding privacy or any other aspect of transborder data flows "may" be in the country's best interests, Dr. Oswald H. Ganley, the State Department's deputy assistant secretary for advanced and applied technology, suggested at a recent National Science Foundation (NSF) meeting of federal information managers here.

At the same time, the French senate began debating the provisions of a na-

tional privacy act which passed the lower house of that country's legislature early in October.

What began as a liberal privacy bill in the French legislature earlier this year was "revised drastically" to become "a very protectionist" measure, U.S. observers in private industry said.

As the French Senate began meetings on the bill just a week ago, the country's private sector was objecting strenuously to the measure's conservatism. What will happen to privacy in France remains uncertain, the U.S. sources stated.

France is one of several countries moving ahead with privacy legislation which could hurt U.S. business interests abroad by keeping data within national boundaries, according to in-

(Continued on Page 6)

## N.Y. Nixes Tax On All Software

By Molly Upton  
CW Staff

ALBANY, N.Y. — The New York State Tax Commission has ruled that both proprietary and custom software are intangible and therefore not subject to state sales tax.

The ruling came on the heels of the commission's decision to assess taxes on time-sharing services based on the nature of the transaction rather than across the board [CW, Oct. 27].

The commission is rewriting the state regulations and will scratch the assessments it has issued, Commissioner Thomas H. Lynch said, adding those with assessments in these areas should wait for official notices being prepared by the department.

Lynch has no illusions that the tax problems presented by DP have all

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Second-class postage paid at Boston, Mass., and additional mailing offices PN127420. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc. Copyright 1977 by Computerworld, Inc. All rights reserved. Reproduction of material appearing in *Computerworld* is strictly forbidden without written permission. Send all requests to Walter Boyd.

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*Computerworld* can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information. COMPUTERWORLD, INC.

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POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, MA. 02160. ac

## Moving Data via Satellite

## SBS Testing Services at User Sites

By Ronald A. Frank  
CW Staff

WASHINGTON, D.C. — Satellite Business Systems (SBS) has begun test demonstrations of the services it plans to provide to business users in the early 1980s.

Data communications is a major part of the Project Prelude tests scheduled by three large telecommunications users between now and January. The tests, being held primarily to demonstrate the SBS service concepts to corporate users, are the forerunners of the commercial services that will be offered by SBS.

Using the same Hewlett-Packard Co. 3000 Series II Model 6 processor systems at each site, the satellite project will demonstrate such applications as high-speed file transfers and terminal

access of remote data bases, according to Larry Hartge, Project Prelude director at HP.

The DP portion of the project is divided into three parts, designed for general management, DP management and "document distribution management" at Rockwell International Corp., Texaco, Inc. and Montgomery Ward and Co., Inc.

At each company, two corporate sites will be selected for installing transportable earth stations in a parking lot. The earth stations will be connected to an indoor conference room where the HP systems and other equipment for voice, facsimile and TV will be shown to visitors.

The first series of demonstrations is taking place between Rockwell facilities at Seal Beach, Calif., and Pitts-

burgh, Pa. Based on preliminary results, Rockwell is giving serious consideration to utilizing satellite communications services when they become available commercially, a company spokesman said.

## Scrambled Data

The HP 3000 CPUs used for the satellite test have 256K bytes of storage, disk and tape subsystems, a 600 line/min printer and CRT terminals. Standard DS/3000 software is being used, according to Hartge, to demonstrate high-speed transfer of data bases between the CPUs.

Each data base is made up of the names of visitors to the demonstration. The data base is then transferred from one CPU to the other at 1.544M bit/sec using Harris Corp. Model 5228 modems designed for satellite use, according to James Hays, principal engineer at Harris.

Although data will be sent in large block sizes, the Harris equipment will scramble the information. This will make the transmissions look like a "continuous pipe" to the receiving modem, Hays explained.

The use of data scramblers will eliminate the dead time that would otherwise appear on the link between data blocks, he said.

Other DP tests in the satellite demonstration project include use of the HP equipment to retrieve remote data base information in both alphanumeric and tabular format and use of a text-editing system to create a letter that will then be distributed to show the potential of electronic mail, Hartge said.

Project Prelude is being operated on the Communications Technology Satellite of the National Aeronautics and Space Administration; the satellite transmissions are using the 12- and 14 GHz bands of the frequency spectrum.

SBS expects to begin operations in 1981 with its own satellite.

## Omnibus Bill Introduced To Spark Privacy Concerns

WASHINGTON, D.C.—In hopes of "stimulating discussion about the need for increased privacy protection," Rep. Richardson Preyer (D-N.C.) has introduced the Omnibus Right to Privacy Act of 1977 in the House of Representatives.

The 12 bills consolidated into the omnibus package and known as H.R. 10076 remain largely unchanged from the original versions introduced since July 12. The major exceptions are in the areas of government access to records about individuals and confidentiality of medical records.

The passage of this omnibus bill would mean recordkeeping changes for medical care providers, banks, consumer credit reporting organizations, educational institutions and insurance companies as well as federal agencies.

In introducing the bill, Preyer said he was "not endorsing any or all of the

[Privacy Protection Study Commission's] recommendations" or presumably, the contents of the bill.

"It is too early in the legislative process for final judgments," he added.

Preyer's Subcommittee on Government Information and Individual Rights will begin "detailed examination of this legislation" after the first of the year, and "I hope that other committees with jurisdiction over privacy-related issues will follow our lead," he said.

As for changes from the original bills, the section dealing with government access to individuals' records maintained in both the public and private sector was amended to include telephone toll records in its list of personal records which the government may not obtain without subpoena.

The other sections remain generally unchanged.

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The chief reason, of course, will be performance. Like all its legendary predecessors, our new brainchild has a remarkably ladylike appetite for your computer resources. It eats like a bird.

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- **20-40% reduction in Elapsed Time;**
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And if you're into multi-programming, our new model can save you 10-40% on other, non-sorting jobs in the mix.

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- **COBOL WRITTEN EXITS — The capability to write sort exits in COBOL, Fortran or PL1.**
- **Control cards for three very useful features:**
  - INCLUDE/OMIT — an alternative to writing programs to choose records to be sorted from a file;**
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## DP Jobs on Increase

NEW YORK — Most "sizable" firms that participated in a recent survey said their DP employment will either increase or remain stable in 1978.

Respondents to the survey that covered all types of jobs also ranked DP functions as the second most difficult to fill, with engineering first, according to Deutsch, Shea & Evans, Inc., a human resources consulting firm here.

Of the 201 firms responding, 38% indicated they expect to hire more DP people in 1978, while another 38% said they expect the size of their DP staffs to remain level.

Two percent expect the size of their DP staffs to shrink, while 1% didn't know and 21% either didn't answer the question or said the question didn't apply.

Forty-seven percent of the firms

responding employed less than 1,000 employees, Deutsch, Shea & Evans said in describing the respondents as "sizable."

Forty-eight percent of the respondents indicated engineering jobs were the most difficult to fill, but 24% cited DP jobs as the most difficult. In many instances, there were multiple answers, the surveyers noted.

Overall, the hiring picture appeared positive, with 51% of the firms indicating they plan to expand the number of employees. Forty-four percent said they plan to add engineers. DP and engineering therefore appear as skills in demand compared with others, such as management. Most respondents — 70% — indicated they plan to keep their management staffs level, and only 14% plan expansion in this category, according to the survey.

## Top DPer's Earnings Rise

(Continued from Page 1)

Although the top DPer's average base salary grew 9.4%, his average bonus rose 50%, the statistics showed.

About 52.5% of the respondents indicated they pay bonuses to the middle-management group of executives, and 56.6% of the 631 firms answering questions about DPer's salaries pay bonuses for their top DP executive.

Among the middle-management personnel listed were top executives in charge of financial relations, general accounting, taxes, financial planning, systems and DP, budget, internal audit and credit & collection. Also included were the corporate insurance executive and the cash management executive.

The DP executive ranked fourth in terms of average compensation among firms giving bonuses, the study showed.

The tax executive and the financial planning executive tied for first with an average of \$52,100, followed by the tax executive with \$47,700. The systems and DP executive weighed in

with \$42,300, followed by the internal auditor executive, who averaged \$38,500, according to the survey.

Firms offering bonuses paid their middle management better than those that did not, with the exception of the very large firms doing over \$5 billion in business.

The average bonus as a percentage of base salary for top DP executives was 21.6%, according to the survey. For companies giving bonuses, the DPer's average base salary was \$34,800 with an average bonus of \$7,500, while companies without bonuses paid an average salary of \$30,500, according to the results of the survey.

As expected, the larger firms pay their DP executive more than the smaller ones. Salaries including bonuses ranged from \$27,700 in firms with revenues of \$25 million to \$50 million, to \$42,300 in firms of \$200 million to \$500 million, to \$77,600 in firms over \$5 billion, the study indicated.

The study is available from the Financial Executives Institute, Inc. for \$35.

## HIS Reacts to IBM 30 Line With Revamp of Level 68

(Continued from Page 1)

Cobol for the old Level 68s systems are object-code compatible with the new environment, a spokesman said.

Data files may require reformatting, but HIS expects to provide a utility program to handle that task, he added.

The company claimed to have a "new approach for data base management" including a "fully implemented relational data base management capability" plus an IDS/II facility "based on the Codsyl standard." A Multics Data Base Manager with similar capabilities was, in fact, announced for the old Level 68 CPUs more than a year ago ["'MDBM' Backs Network, Relational Data Approaches, CW, Sept. 9, 1976] and, apparently, has already been installed in at least one location.

Also claimed as new but listed in independent references as long ago as August, the end-user-oriented Logical Inquiry and Update System (Linus) is said to be a self-contained data base manager, unrelated to either IDS or MDBM. Linus supports the novice in retrieval and updating tasks, the spokesman explained.

### Other Enhancements

Other enhancements claimed by HIS for the Multics/Gcos control software include new modules for management of on-line computing and facilities for dynamic reconfiguration (apparently to change the environment available to any given user, somewhat along the lines of IBM's Virtual Machine Facility [VM/370]).

Still other software extensions include facilities supporting "dynamic metering and tuning," "isolation of user workloads" and "guaranteed response and turnaround time for priority applications," the spokesman added.

First release of Level 68/DPS software will be available in the U.S. in the second quarter of 1978, the company said. Gcos is provided with the user's hardware but all other software is separately priced.

License fees include \$1,000/mo for Linus and \$1,050/mo for the basic relational portion of MDBM. Users requiring network-oriented data bases face an additional cost of \$200/mo, bringing the complete MDBM license fee to \$1,250/mo.

### Communications Functions

Communications functions for the Level 68/DPS include resource-sharing between DPS machines and "foreign hosts" using both "direct" links and private-line nets, HIS said.

The system can operate in packet-switching networks with X.25 and HDLC protocols. Enhanced Multics functions include electronic mail, word processing and teleconferencing, which can operate on packet nets "between multiple remote terminals," but such implementations have not yet taken place, a spokesman said.

The DPS system includes an integrated communications processor which provides most of the capabilities of the earlier 6678 Datanet front end. The integrated processor handles up to 96 lines, after which 6678s can be added to a DPS system. A full range of line interfaces and terminal equipment

previously supported in Level 68/60 and 68/80 can operate on the 68/DPS system, HIS said.

### Performance Upgrades

Upgrades to different performance levels are accomplished through a change in some logic and memory, the spokesman noted. Going from performance Level 1 to performance Level 2

## Itel Adds Another AS/5

SAN FRANCISCO — Itel Corp. last week extended its Advanced System (AS) family of mainframes with a system it claimed has power "equal to or greater than" the IBM 3031 CPU.

The Model AS/5 Model 7031 is also rated 10% to 20% more powerful than the AS/5-3, Itel said.

The Model 7031 features a processor cycle time of 100 nsec and expanded reloadable control storage, according to a spokesman. Up to 8M bytes of monolithic main memory can be attached to the Model 7031 in 1M-byte increments, he added.

A 32K high-speed buffer memory and a 128K entry translation lookaside buffer are provided to enhance processor execution Itel noted.

Users with AS/5 Model 1 and Model 3 or the AS/4 can reportedly upgrade to the Model 7031 in the field.

First deliveries of the AS/5 Model 7031 are scheduled for the fourth quarter of 1978. A typical 2M-byte system will cost \$1.1 million, Itel said from One Embarcadero Center, San Francisco, Calif. 94111.

costs an additional \$9,670/mo on a five-year lease or \$512,000 if the upgrade is purchased. The move from Level 2 to Level 3 costs \$11,700/mo or \$573,000. A Level 3 to Level 4 upgrade costs \$9,075/mo or \$555,000, and each additional CPU that is added to Level 4 costs an extra \$7,765/mo or \$474,000.

A basic Level 1 system, with 512K words of memory, a communications processor and console costs \$31,900/mo on a five-year lease or it can be purchased for \$1,259,000 with a \$4,124/mo maintenance fee. Additional memory, which comes in 256K-word increments up to the 1M-word level and 512K-word increments up to the 16M-word level, costs \$110,000 per 256K word.

A more powerful communications processor, which comes with 65K words of memory, costs \$190,870 or \$3,489/mo.

At the fourth level, the 68/DPS has a purchase price of \$2,899,000 with a monthly maintenance fee of \$7,777. The system leases for \$62,345/mo.

Level 68/DPS models and first releases of software will be available in the second quarter of 1978, the spokesman said, noting that 68/80s can be field-upgraded to 68/DPS systems.

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WANG

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The result is Shadow II. Today it's brand leader in the very tough European market.

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Shadow II was specifically designed to conserve programming resources. So, unlike other systems, the Shadow II programmer never has to establish addressability.

Because Shadow II provides so many more pre-written facilities the coding is far less complex than with other systems.

Shadow II can also save the IBM TP user between 25% and 75% of his main memory and CPU time requirements compared with any other system.

Terminal response times will always be faster with Shadow II – sometimes by a factor of three or four. There are many reasons for this, but one of the more important is that Shadow II provides users with unique high performance access methods to terminals and files rather than using antiquated IBM modules.

In brief, Shadow II is the fastest, most cost-effective and easiest to use TP package in the world.

So, to quote old Tom again, we hope we've given you cause to "think" – about your TP requirements.

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## Firm Claims in Survey

# CDC Plans No Hike in South Africa Spending

By Molly Upton  
CW Staff

MINNEAPOLIS — Control Data Corp. was the only computer firm responding to a survey by the United Church Board for World Ministries (UCBWM) that indicated it does not plan to increase its investment in South Africa.

The exception to this principle, CDC added, is a large-scale computer-based education system for blacks in South Africa for which it has allocated funds and is seeking cooperation from the U.S. and South African governments.

CDC, Burroughs Corp., IBM and Honeywell, Inc. responded to the survey of 47 multinational firms conducted by the UCBWM, which asked for corporate withdrawal of investment from South Africa. None of the respondents indicated they had plans to withdraw, the church said.

CDC said it sees the proposed educational program as "the most practical means of bringing about a significant closure in the education gap and hence the opportunity gap for millions of underprivileged people."

Commenting on its current operations in South Africa, CDC indicated that although the operation is small, it considers that it has helped stimulate progress in working and living conditions for the families of its employees.

CDC's objective in South Africa has been to assist, through its business and employment practices, the progress in the living conditions of the deprived population there, according to the firm.

### Six Principles

The DP firms' responses included support of six principles prepared by Leon Sullivan, a black minister, which call for fair employment, equal pay, more supervisory training and jobs for nonwhites and improvements in employees' living conditions.

Burroughs indicated that it was instrumental in drafting the six principles, which it supports, and that it feels withdrawal would be counterproductive.

Corporations can be effective in improving employment levels and the standard of living, the Burroughs reply explained, according to a spokeswoman for the UCBWM.

Honeywell President Edson Spencer cited the adverse effects of withdrawal, such as increased unemployment, which would harm the blacks, the spokeswoman said.

IBM supported the six principles and indicated that where necessary, it will modify its current policies in South Africa to comply with the principles.

IBM also stated that it does not bid

for business where it believes its equipment would be used to abridge human rights. The firm said it believes a corporation should be free to do business in any country where it is acceptable to the U.S. government.

Withdrawal for political motives would represent a corporation injecting itself into the conduct of foreign policy, the IBM statement indicated.

## U.S. Trailing on Transborder Data Issues

(Continued from Page 1)

industry representatives attending the NSF meeting.

Ganley expressed the new sense of urgency with which the State Department is treating the European determination to come up with an international convention dealing with privacy and the transnational movement of information. "Until a few weeks ago, the European and the U.S. efforts in this area were leisurely," he said.

But the decision by one of the European organizations involved — the council of Europe — to direct its committee of experts to come up with a draft convention in two years has put all concerned countries under time pressure, Ganley stated.

The U.S. must decide how to deal with the fact that it is not a full member of the Council of Europe and therefore will have no role in the political discussions that will mold the final draft convention. Ideally, a U.S. effort in this area would be transferred to a European organization in which the U.S. does enjoy an equal status, the Organization of Economic Cooperation and Development (OECD).

### March Meeting Set

The chief U.S. organization formed to deal with the Europeans on the transborder data flow question, the Ad Hoc Interagency Task Force on Transnational Data Flow, met for the

first time late last month under the auspices of the National Security Council.

Out of that meeting came the determination to hold an intensive two-day conference in March on this issue. Sponsored by the State Department and the Commerce Department's Office of Telecommunications (OT), the conference on transborder data flows is currently in the planning stages.

In a related development, the OT is busy compiling, translating and abstracting for public use the available foreign national privacy laws. This effort should be completed sometime next month, according to a Commerce spokesman.

While these official U.S. government efforts have encouraged some, they have not convinced other observers that what they believe to be European efforts to use the privacy issue to mask concerns for national sovereignty and protection of national computer and communications industries will be effectively challenged in time.

The interagency task force "has yet to get its act together," according to sources close to the work of that group. "It is nothing more than a facade with no resources to work with," they said.

Similarly, the OT currently has no funds budgeted for the study of transnational data flow issues.

Representatives from various seg-

ments of the industries affected by the movement of information across national borders — data base creators and suppliers and specialized communications carriers — urged the federal information managers attending the NSF meeting to become involved in these issues. They contended U.S. business opportunities are already being lost.

The managers were invited to make suggestions for the conference the interagency task force has planned and to comment on a 22-page position paper on the subject, written by the State Department's Morris Crawford and entitled "Protecting Privacy in International Data Processing."

Whatever the U.S. strategy turns out to be, interests other than those of the private sector should be included in such policy formulation, one participant said.

Another urged a reconciliation of the interests of the creators and communicators of information within the U.S. and between the U.S. and other nations.

Ultimately, transborder data flow issues must fit into the context of a U.S. information policy, several NSF meeting participants agreed. "We can't get anyone to talk about the total issue," one said, noting the "unwillingness" of the highest levels of government to look at the formulation of such a national policy.

Federal information managers could play an important role in raising the level of consciousness on these issues, another participant suggested.

Without a firm policy and a specific contact in government on transborder and related DP, communications and information issues, the other nations of the world will continue to see the U.S. as weak and vulnerable in these areas, still another said.

## IEEE Picks Getting

NEW YORK — Dr. Ivan A. Getting, president of Aerospace Corp., has been elected president of the Institute of Electrical and Electronics Engineers (IEEE).

Getting defeated Irwin Feerst 24,793 votes to 24,753, according to Donald T. Hess, chairman of the IEEE Tellers Committee.

Elected to the position of executive vice-president was Dr. C. Lester Hogan, who defeated Carleton A. Bayless 28,161 votes to 21,753.

### Correction

In the CW Stock Trading Summary of Nov. 14, National CSS' week net change should have been up 1.75 after a two-for-one stock split.



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# IBM Decides to Phase Out Operations in India

By Nancy French  
CW Staff

ARMONK, N.Y. — Rather than sell 60% of its business in India to Indian stockholders, IBM World Trade Corp. has decided to phase out its manufacturing and sales branch there by mid-May, the company confirmed here last week.

The decision came after a long period of negotiation between IBM and the Indian government on the conditions under which the mainframer could continue to do business within that country [CW, Oct. 17]. The problem arose after India passed the Foreign Exchange Regulation Act, which permits 100% foreign-owned firms to remain in the country only if their sole operation is manufacturing devoted exclusively to export.

IBM's future presence in India will be "limited to a liaison office which the company will establish, subject to government approval, in order to be able to receive authorized requests for IBM products and services," the firm said.

All equipment presently rented from IBM will be offered for sale to the renters, the spokesman said, but he did not know what would happen in cases where users could not buy the equipment.

Future equipment orders would ap-

## Two Acquitted In DP Spy Plot

MIAMI — Two men charged with conspiracy in connection with a plot to transport technical data and military components to Soviet agents were acquitted of some of the charges and convicted of others — but both say they will press for a new trial.

A jury in federal district court here last week acquitted Carl Lutz Weischenberg and Carl Heiser III on charges of conspiring to export technical data contained on a Memorex 100M-byte disk pack.

The jury, however, did find the two guilty of conspiring to export a Litton 51 inertial navigation device without a license, according to Weischenberg's attorney, Richard Rachlin.

In addition, Weischenberg, a West German citizen, was convicted and Heiser was acquitted of the charge of failing to register as an agent of a foreign government.

Heiser faces a maximum sentence of five years and/or \$10,000 fine while Weischenberg could face 15 years and/or a \$20,000 fine, according to Steadman Stahl, Heiser's attorney.

The charges were initiated by an affidavit from an FBI agent alleging the two men were engaged in a plot to transport components of a cruise missile to Soviet agents [CW, Aug. 8].

After giving their verdicts, however, two jurors told Judge Joe Eaton they would like to enter different verdicts, according to Stahl. The foreman indicated he would like to change his vote to not guilty for Weischenberg on the charge of failing to register as a foreign agent.

The other member of the jury said she believed the men were not guilty on all counts. However, she said, she had not understood that she could have disagreed with the other jurors and voted not guilty, Stahl said.

parently be limited to purchases and would have to be approved by the Indian government, he said.

IBM's DP manufacturing operation will be discontinued within 60 days and its data center services, card manufacturing and DP maintenance operations "disposed of" — that is, sold to Indians. Those IBM India employees currently working for the firm would "hopefully" be employed by the new owners, IBM said.

The Indian government and IBM have reportedly signed an agreement to service IBM customers in India, "outlining mutual agreements on various issues including transfer of spare parts, tools and test equipment," according to a report from United Press

International. However, an IBM spokesman here could not confirm this.

IBM is the second U.S. firm to announce plans to take such action since the Janata Party took office in March. The first was Coca-Cola, which withdrew because it reportedly would have had to reveal its cola formula to stay.

### Last-Ditch Plan

In a last-ditch effort to remain in the country, IBM said, it offered to split its interests there into two companies. One, which would have been owned 100% by IBM, would continue the traditional marketing and maintenance activities, while shifting its manufac-

turing to an export-only operation.

The other company, with 60% Indian ownership, would take over IBM India's service bureau operations.

IBM also offered under the plan to support Indian technological development through a scientific center to be established for computer research.

The firm's proposal also included a facility for assembling and testing integrated circuit cards and a measurement and analysis laboratory for electronic components, both to be operated by an Indian government.

IBM would also have made IBM patents available to Indian organizations.

IBM Chairman Frank T. Cary called the decision to phase out the Indian subsidiary "a great disappointment."

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## In 'Project Integrity'

# HEW Using DP to Root Out Medicaid Fraud

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — The Department of Health, Education and Welfare (HEW) plans to use computer technology as much as possible in its efforts to root out fraud and abuse in federal programs.

In addition to "Project Match," an effort aimed at uncovering those federal employees who are illegally re-

ceiving welfare benefits, Project Integrity has been instituted to examine the computerized billing data of physicians and pharmacists seeking reimbursement for Medicaid services.

HEW has studied approximately 250 million bills submitted by 275,000 physicians and pharmacists during 1976 for Medicaid money. Project Integrity compares the services offered per patient with a set of standard pro-

cedures and practices of physicians and pharmacists, drawn up for HEW by a panel of experts, an HEW spokesman explained.

The computer is programmed to "kick out" those cases which go beyond the parameters set by the 22 physician and 26 pharmacist procedures and practices contained in the system, he said.

For example, if a physician indicates

that a patient visited his office more than 40 times in one year, the system will flag that billing for further investigation, the spokesman said.

More than 20 home visits by the physician or more than one tonsillectomy for a patient would prompt similar investigations.

HEW has found 47,000 physician and pharmacist bills which described services that went beyond the limits set by the system. To test the usefulness of the computer in highlighting fraud, the department is now investigating 25 of these cases involving physicians and 25 involving pharmacists in each of the 49 states offering Medicaid.

There have been no prosecutions to date, but the investigations are ongoing, he said, adding HEW should have some results from Integrity soon.

## Project Match Worries Privacy Advocates

(Continued from Page 1)

within the last 18 months.

The department plans next to verify the employment of these people with the government and to obtain their earnings records from the federal agencies employing them.

State and local officials will then be asked to determine — chiefly through state welfare agencies — whether these identified individuals are eligible for benefits and, if so, at what levels, the HEW Secretary explained.

Based on these determinations, state and local governments will reduce or terminate payments to those found ineligible. Prosecution may be warranted in some cases, but these decisions will be left up to the U.S. Attorney's offices and the Federal Bureau of Investigation.

Those AFDC recipients whose grants will be reduced but who will not face prosecution may be suspended, demoted or removed from their jobs, an HEW spokesman said.

### D.C. Numbers

In the District of Columbia, where the city government and HEW have completed the project's pilot program dealing only with HEW employees, the department found 216 matching cases; 142 of these raised questions requiring further investigation.

Thus far 102 of those 142 cases have

been fully investigated for welfare eligibility. Fifty-eight individuals are totally ineligible and either have been or will be removed from the rolls; 32 have had or will have their welfare payments reduced; two are being underpaid and will have their benefits increased; and 10 were found to be receiving the proper amount, the HEW Secretary reported.

HEW has yet to decide what criminal, civil or administrative sanctions will be taken for those receiving more than their fair share.

### 'Privacy Assured': Califano

Developed with the Civil Service Commission and the Department of Justice, Project Match "is conducted under procedures aimed at ensuring the privacy rights of all federal employees," Califano stressed.

To this end, HEW has assumed full custody of computer tapes and printouts, hand-carrying these materials to federal and state agencies wherever possible; the agency has also ensured that only senior staff in HEW and other governmental units have access to sensitive information, the spokesman stated.

In the next few months, other states and localities as well as the Department of Defense and a number of large corporations will be asked to participate. HEW hopes to make this an

annual program, Califano said.

"Passage of the [Carter] administration's welfare reform plan — and the consolidation of the major income maintenance programs, AFDC, Supplemental Security Income and food stamps, in one set of computers — will increase the scope and effectiveness of such checks," he said.

While the computer tapes from the 21 participating jurisdictions are in hand, Califano has authorized Project Match officials to check records from states against one another to determine whether any recipients are "double dipping."

In the raw match done on Maryland, Virginia and the District of Columbia, 131 individuals were found receiving benefits in both the District of Columbia and Maryland; 16 in both the district and Virginia; 23 in both Maryland and Virginia; and six with benefits in two different locations in Virginia.

How far beyond federal employees HEW's matching efforts will extend remains questionable. Following an Oct. 13 meeting with members of business and industry, Califano reported that several large corporations had agreed to turn over their payroll records to the department for checks against the welfare rolls.

Representatives from both IBM and AT&T indicated they would not do so.

## New York Nixes Software Taxes

(Continued from Page 1)

been solved. "I'm certain we've chipped away only the tip of an iceberg because there's going to be a constant problem with this type of industry," he commented. "But at least we now have our philosophy straight and can proceed from there."

However, he added, "I'm ecstatic about what we've gotten done in this length of time." Members of the DP community first met with tax commissioners Aug. 23.

### Time a Factor

The three tax commissioners voted 2-1 in favor of the decision to exempt software from taxation. One of the reasons for the decision was the length of time — 11 years — during which the state did not publish regulations regarding software taxation, Lynch said. "The presumption shifts to the taxpayer ... and we're talking about equities and an extremely close question of law," Lynch said.

"It's a whole new state of art, a new business, and it hasn't been taxed for years ... I would be much more comfortable as an advocate in court arguing that programs are intangible property," he added.

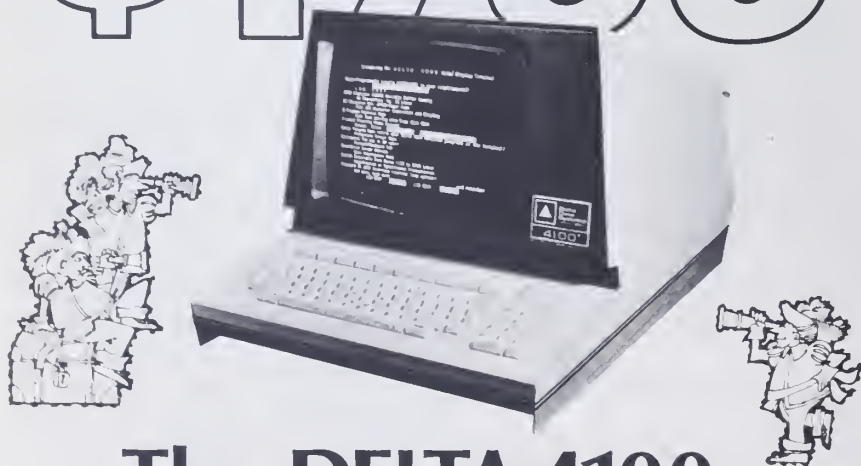
Because the Department of Taxation and Finance recognizes new regulations will not make everything black and white for everyone, it has designated the Technical Services Bureau to answer taxpayer questions.

Users with questions can address their inquiries to Harris Sitrin, New York State Department of Taxation and Finance, Technical Services Bureau, Building 9, State Campus, Albany, N.Y. 12227.

Furthermore, to ensure that the regulations are easily understood and can be easily implemented, the commission is establishing a task force of industry representatives, Lynch said. Those interested in serving on the task force should write to Lynch at the Department of Taxation and Finance, Room 215, Building 9, State Campus, Albany, N.Y. 12227.

Lynch cautioned that the decision to exempt software from taxation will not apply to over-the-counter retail sales of programs for home TV games.

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# User Sees Mini as Key to Data Entry Savings

By Jeffry Beeler  
CW Staff

TORONTO — "Thinking small is fun; and you'll probably save a lot of money doing it," James H. Grant said here recently as he described the steps he and his colleagues took to implement "one of the best data entry systems around."

In an address on "Minicomputers in Data Entry" at the Canadian Computer Show (CCS), Grant, who is programming manager for the University of Western Ontario's Information Analysis and Systems Department, conceded that the punch-card system his staff currently uses is more than twice as expensive as the one they had before.

This increase in rental costs, however, has been more than offset by boosts in data throughput, he added.

His staff used to average 8,000 keystroke/hour. Today, that rate has jumped by 50% to 12,000 keystroke/hour, Grant said.

Built around a Consolidated Computer, Inc. Key-Edit 1000, the system was installed in 1976 as a replacement for the Key-Edit 50 system that had been implemented the year before.

In installing the hardware, Grant and his colleagues insisted on maintaining tight controls that allow the operators

of the system's 24 keyboards to keep track of the data that has been submitted for processing by the university's

## CW at CCS

faculty and administrative users.

This control system consists in part of placing each batch of punch cards in its own uniquely numbered plastic bag, he explained.

The control system also consists of transferring data from disk storage to magnetic tape twice daily. This precaution ensures that the data entry de-

partment will never lose more than half a day's keypunching if the system breaks down, he said.

He and his associates have also programmed their punch-card system to automatically select the correct data entry format based on record identifiers entered at the keyboards by the equipment operators. The system currently accommodates 300 record formats, Grant said.

This automatic format-selection feature allows keyboard operators to spend 70% of their work time keypunching — an unusually high percentage, he claimed. It also allows systems supervisors to count keystrokes, records processed and total keypunching time.

In negotiating the contract for the

system, Grant added a clause that protects his department from extended service charges.

When the time came to install the system, the programming manager posted installation deadlines. "When you announce publicly that you're going to do something by a certain time, you almost have to stick to your timetable," Grant said.

Besides the Key-Edit 1000 system, Grant and his staff considered installing a Key-Edit 50 system and an IBM 2740.

To evaluate these and other hardware alternatives, staff managers tested equipment at vendor sites and studied data entry systems at various user locations similar to their own.

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## NCC to Expand Exhibit Space

MONTVALE, N.J. — An auxiliary exhibit hall that can accommodate an additional 270 booths will be constructed for the National Computer Conference (NCC) scheduled from June 5-8 at the Anaheim (Calif.) Convention Center.

The "West Hall" will be completely air-conditioned, carpeted and well lit, and all exhibits will be column-free in order to duplicate the environment typical of an NCC exhibit, a spokesman said. Reservations for exhibit space in the hall will be taken from those companies currently on the waiting list for NCC '78. If additional space is available after these companies have been accommodated, it will be offered to other companies that fulfill NCC exhibit requirements.

The NCC committee has approved modification of a recently built carport at the center at a cost of about \$100,000 because of the number of exhibitors that have requested space.

Modifications involve adding heavy-gauge canvas sides as well as lighting, carpeting and air conditioning, to the port according to a spokesman of the American Federation of Information Processing Societies, Inc., sponsors of the annual conference.

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# Women Seen as Data Entry Managers

By Jeffrey Beeler  
CW Staff

TORONTO — Women make better data entry managers than men, said R.A. Badley during the opening day of the Canadian Computer Show (CCS) here recently. Unfortunately, they account for only a relatively small fraction of their fields total work force, he added.

Badley, executive DP officer for the Mutual Life Assurance Co. of Canada, contended that women are better than their male counterparts when it comes to developing rapport with their subordinates. Badley said he based his opinion on first-hand observations of male and female data entry managers in action.

Badley's observations about the relative competence of men and women data entry managers underscored his comments on the importance of motivating clerical personnel in the typical keypunch or key-to-disk system environment.

Most companies treat the rank-and-file members of their data entry departments as second-class citizens whose working space is usually

"somewhere in the bowels of the building," Badley said. For this reason, data entry

The surest way to a data entry clerk's heart, of course, is through the pocketbook, but

Managers can also motivate their employees by soliciting and respecting their opinions, the insurance company executive explained. "Data entry people aren't the dummies they're sometimes thought to be, and many can provide useful suggestions for overcoming department problems," he said.

Other goals he urged data entry managers to achieve include attracting capable per-

sonnel, maintaining high volume with quality output and minimizing costs.

In their search for qualified keyboard operators, managers should not automatically exclude men from consideration, as so often happens in data entry departments, Badley told listeners. Though not nearly as common as women at the clerical level, some men make excellent keyboard operators, he said.

## CW at CCS

managers must take great care to keep the equipment operators in their departments as happy as possible, he explained.

pleasant working conditions — draperies, carpets and other amenities — also provide an effective worker inducement, Badley said.

# The Computer Catch-22

*What do you do when you get too big for your small computer but you're still too small for a big one?*

## Product Misses Its Own Debut At Toronto Show

By Jeffrey Beeler  
CW Staff

TORONTO — If you've ever lost a letter or a package in the mail, take heart — your problem could have been worse. And if you don't think so, talk to Bill Barrows.

Through no fault of his own, Barrows, a senior consultant for Control Data Corp., lost a cartridge drive in shipment. As a result, the product, which was supposed to make its North American debut at the Canadian Computer Show here recently, missed its own unveiling.

Barrows shipped the Model 9448 drive from its manufacturing site in Oklahoma City, (Continued on Page 11)

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people can call up the facts they need in the form they need them. (Yet the information is protected against unauthorized users by a multi-level security system.)

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# One-Time Hardware Investment Cost Should Guide Choice of OCR, Users Told

By Jeffrey Beeler

CW Staff

TORONTO — If you're in a quandary over whether to install an optical character recognition (OCR) system, let cost be your guiding consideration, Tony Bloom advised at the Canadian Computer Show here recently.

Bloom is a marketing manager with OCR Concepts,

Ltd.

Cost constitutes OCR's principal claim-to-fame as a data entry technique. The only major expense item associated with a system employing that technology is a one-time-only hardware outlay, Bloom said.

Depending on the variety of fonts it accommodates, an OCR system can cost from \$1,000/mo to \$150,000/mo,

he explained.

The other overhead items like labor are insignificant by

to perform increases dramatically, Bloom said.

With keypunch machines as

## CW at CCS

comparison. As a result, an OCR system's upkeep remains fairly constant even if the workload it is called upon

well as key-to-disk systems, the opposite is true, he said.

Looking beyond the cost question, the marketing ex-

ecutive advised prospective users to acquire an OCR system only if they can control the major variables of forms design and data presentation. Specific criteria they should meet include the following:

- Their applications must consist of a few, high-volume jobs.

- The data to be read must be mechanically produced.

- They must be able to control the design of the documents their reader will use.

- They must be able to control the form in which documents are submitted to the OCR system operators.

Users should avoid OCR equipment, Bloom continued, if the following conditions apply to their applications:

- They perform many small applications. The cost of programming the system to select the appropriate data entry format for each job will probably prove prohibitive, he said.

- Their data originates from many sources.

- They can obtain only a carbon copy of the data to be read.

## Exhibit Misses Toronto Debut

(Continued from Page 10)

Okl., on Nov. 4, four days before it was scheduled to be exhibited. Because he sent the product by private air carrier, Barrows assumed it would reach its destination with plenty of time to spare.

But an unexplained delivery foul-up scuttled his plans. By the last day of the show, the would-be exhibit still hadn't arrived, and all efforts to determine its whereabouts had failed.

To make matters worse, the incident here isn't the first time Barrows has been victimized by a shipping miscue. A similar snag occurred only last October in Munich when another 9448 arrived two days late for its European debut at the System 77 computer show. "We looked and looked for the drive and finally found it sitting in a cargo hangar at the Munich airport," he recalled, shaking his head.

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47702HPG3

IN DEPTH

IN DEPTH

IN DEPTH

IN DEPTH

# TSUNAMI

By Charles P. Lecht

**W**hile the frequency and size of the waves of technological and economic change increase, natural and not unexpected counterforces are building. These counterforces range across a spectrum from obviously long-term beneficial ones to others which potentially inhibit our ability to exploit our own achievements.

It is to be hoped that forces in the latter category constitute unusual phenomena. But out of the maelstrom of conflicting forces we should not be surprised to see the emergence of an undertow which may siphon U.S. technology offshore, only to return suddenly one day to swamp and neutralize the position of technological leadership we now hold.

With leadership in computer technology at least as valuable as the possession of oil or gold in ensuring our position as a world power, it seems important that we re-examine our short-range socioeconomic priorities to bring them more into line with our long-range interests. For many defenders of our socioeconomic and political systems suggest that, as the waves of change in computer technology are increasing, concomitant world political unrest bespeaks an increase in a larger international strife as well.

Whether or not we accept this view, as world powers test their strength, it would be ill-advised for us to ignore that rapid change is occurring and that some of the currents of this change are not flowing in furtherance of our best interests.

It seems beyond argument that social, economic and political unrest are on the upswing. Prudence suggests that, even if they finally do resolve themselves into a future of peace and plenty, we keep our guard up until we can be a bit more sure of the outcome.

While we await a global reconciliation, commodities may be less valuable in our brave new world than are the means of their control. For example, Iran will be hard pressed to utilize its vast oil and gas resources internally in the next century (especially with low-cost atomic reactors on the horizon), but it nonetheless wields enormous power by controlling their flow to deservicing (or at least politically convenient) nations.

With most of the world's computer technology heavily influenced, if not directly controlled, by U.S. companies (with a disproportionate amount of this influence emanating from IBM, and not insignificant amounts flowing

from the other giants of world computer technology — namely Univac, Burroughs, NCR, Control Data Corp., Honeywell Information Systems and Digital Equipment Corp., we, like Iran, are in a highly influential position with respect to the use of our commodity (in this case computer technology.)

It would be naive of us to believe that those who *willingly* depend on our computer technology are not aware of this, while those who *have no choice* but to do so, because of lack of access elsewhere, are intensely aware of this. And it is only the most naive who believe that the privileged position we occupy by virtue of our level of technological achievement can be leapfrogged with ease.

However young our industry is, we represent the most seasoned body of know-how in the manufacture and usage of computer systems to be found anywhere.

This leadership position will not be easily overcome by non-U.S.-based companies without assistance from ourselves, although some first signs that this situation is changing in various sectors of our technology are beginning to be visible.

The recent success of Japanese manufacturers in hand-held calculators, xerography and in other electronics-based products clearly demonstrates that leapfrogging is possible — and happening!

Even if technological leapfrogging is on the rise, it is still the exception mode. However, as we shall see in this book, U.S. governmental intervention in our computer industry seems to be increasing rapidly.

Depending on the ways in which this intervention manifests itself, our frog may find that it is being held still just long enough to be walked over at leisure by a well-coordinated tortoise, a tortoise unfettered by our labor, social and other rules.

And contrary to our own government's apparent mode of intervention in our technology, the intervention of foreign governments in *their* technology-producing industries supports them to the hilt an accelerates their rate of improvement.

What can and will happen if these trends continue?

Like *The Waves of Change*, this new work is a technoeconomic analysis of the world computer industry and its user community. At the same time, it presents more of the sociopolitical implications of our technology.

While I say "world," I am the first to admit that, in certain areas of concern,



Charles P. Lecht

I, as well as you, may be drawing my opinions from a well of ignorance too eager to be tapped. But I feel that incorrectly stated hypotheses represent less of a danger than does the lack of any hypothesis whatever.

Anyway, however provisional the idea expressed here may be, I believe most to be essentially correct and the others to be on the right track. If an idea is downright incorrect, I apologize at the outset; it is an imperfect world.

And, while I may seem more concerned with world technology in this book than I ought to be, the reader should understand that this is the case

less by design than by simple necessity; to comprehend developments at home, we are compelled to look abroad for the fullest possible explanations.

Each chapter will address what I believe to be overriding factors in our consideration of today's endless panorama of computer technology. Needless to say, our preoccupation with today may be better understood through historic perspective, but with ever greater portions of history consuming ever smaller amounts of time, current happenings seem to be substantially more important to our quest for a meaningful vision of the future.

The waves of technological change affect not only the DP community, but the social, economic, political and psychological climates of the world. This week and in the weeks ahead, Lecht will probe the nature and extent of those changes.

IN DEPTH  
IN DEPTH  
IN DEPTH  
IN DEPTH

## IN DEPTH

Charles Philip Lecht is founder, president and chairman of the board of Advanced Computer Techniques Corp. (ACT), a computer software consulting firm.

Lecht holds a B.S. in mathematics from Seattle University and an M.S. degree, also in mathematics, from Purdue. His involvement in the computer field stretches back to 1951, making him an "old-timer" in a very young industry.

Among his earliest professional activities were programming for IBM's service bureau and for the MIT community's Lincoln Laboratory/Mitre organizations on a variety of scientific and military simulation projects.

From 1960 to 1962, Lecht served in the U.S. Army Ordnance Corps, first as chief of its Programming Division and subsequently of its Mobilization Applications Division.

Lecht came to New York City in 1962, where he founded ACT. In the 15 intervening years, the company has grown from a one-man show to an international complex employing some 400 persons and deriving more than 50% of its revenues from operations in Europe, Canada and the Middle East as well as the U.S.

In addition to building and presiding over ACT, Lecht has found time to hold a number of teaching posts, author five books and innumerable articles and maintain a heavy schedule of speaking engagements in the U.S. and abroad. His books include three on computer languages, one on project management and a technoeconomic analysis of the computer industry, *The Waves of Change*, which was serialized in excerpted form in *Computerworld* this year and will be published by ACT next month.

Lecht is a member of the Young Presidents Organization, The Hudson Institute, the Data Processing Management Association, Association for Computing Machinery and the New York Academy of Sciences.

In 1976, Lecht was designated by "The Gallagher President's Report" as one of the "10 best businessmen in the U.S.A." representing companies with income below \$1 billion. Profiles of Lecht have appeared in *The New Yorker* and *Datamation*, among other publications.

Most recently, Lecht has been requested by the Computer and Business Equipment Manufacturers Association to argue its case against the proposed I/O interface standard before Congress.

In any event, I and those who are helping me prepare this book have a great desire that it add to and enrich your understanding of computer technology. Where it proves inadequate, the reader is encouraged to improve upon it by interpolating his own ideas.

While *Tsunami* appears with my name as author, it might be more accurate to describe me as originator, orchestrator and participating author. While many have joined to give it life, none played more important roles than Robert Fertig, vice-president of Advanced Computer Techniques Corp's (ACT) Technology Analysis Group, and Carl Menkel, Manager of ACT's Documentation Services Division.

**I** The once relatively clear roles of government as user, promoter and regulator of industry seem to be blurring. Let's take a closer look at this for, in some ways, it represents an overriding factor in asaying the future of our industry.

While addressing the role of government in general, we will chiefly have recourse to the U.S. government for specific supporting examples, in recognition of its (current) primacy in the arena of computer technology-related developments worldwide. Given the complexity of this issue, I must, at the outset, beg the reader's patience in evaluating my point of view; we all

know the risks of holding opinions with which we can be too readily identified. Although they are surely vulnerable to counterarguments, I nevertheless believe the following ideas represent more than a casual elegy on the subjects addressed.

In contrast to the latest positions apparently taken by the U.S. government wherein most of its policy preoccupations vis-a-vis U.S. computer technology seem of either a restrictive or punitive nature, European and Asian governments are rallying around their indigenous industries. This constitutes a reversal of government vs. private sector positions with respect to domestic and foreign government/DP interactions and suggests that broader international issues, involving such factors as balance of payments, alliances, even our defense posture, are undergoing change.

Thus, we seem to be racing headlong into a situation wherein we may well have to adopt, during a period of relative calm, the kinds of measures normally reserved (under our law) for periods of national crisis. These include ideas that strike at the heart of our socioeconomic system including antitrust law abridgments, privacy law curtailments and so on. For flowing through the ever-expanding networks of electronic technology from which technology great benefits may be derived are the means to wreak national and international havoc in ways unanticipated in earlier, essentially mechanical, times.

While not new, the emergence of this problem as a significant element in the equation began with technological improvements to aircraft and reached an alarming level with our manufacture of atomic reactors. At this point, it seemed as though we had finally concluded that too much technical sophistication combined with too little personal sophistication might be dangerous — and we still scurry to find ways to eliminate the possibility of triggering a nuclear conflict in a moment of "accidental" madness.

However, with computer technology, it's the first time that the entity serving to promote this phenomenon has been so invisible, while at the same time so obtainable by almost anyone. Spreading communications capabilities, as currently conceived, provide us with the means to create de facto violations of precomputer/communications era laws and statutes, both national and international.

Can anyone doubt this when — today — from a small office anywhere in the U.S.A., a telex service can be activated

for global communications piggy-backed upon the environments provided by time-sharing organizations, including (with little additional hardware) message switching with ring-up?

We find no conflict in the fact that an organism must take time to locate and/or cultivate sources of nourishment, as well as reserve time for the digestion of its food; it is obvious that both categories of activity are essential to survival. From at least one perspective, this holds true for artificial as well as natural organisms; government is a case in point. If governmental viability is to be achieved with all this implies, social structures must seek a useful index to the state of their health in the balance struck, both through formal and informal compromises, between their creative impulses for a better future (the desire for change), and their equally compelling impulses to realize some benefit now (consolidating/capitalizing upon change).

It is a basic and proper function of government to encourage change so that our long-range goals and short-range needs are singly and jointly not compromised too much as we go about life's business. This is a complex task, wherein the goals are usually somewhat more easily identified than are the means by which they are to be achieved.

It seems incumbent upon the agencies of government which bear responsibility for developing appropriate recipes to derive the most benefit from change, to draw upon the best advice available as part of that process however incomplete it may be. In no other way can these agencies fulfill their functions as arbiters/synthesizers and analyzers of life-supporting processes.

In the purest sense, these agencies are controllers of Hegelian episodes in tearing down the old, regenerating the new and minimizing associated counterproductive noise. In order to fulfill this role, self-policing action must occur, a concept which, for the totalitarian government, remains a paradox at best, and for a democratic government requires an almost impossibly delicate interplay between the "by" and "for" of it all.

Practically speaking, such government participation involves the creation of rules and standards as well as the exercise of regulatory powers, all of them designed to serve the common interest. Frequently the efficacy of such measures can only be known in an ex post facto way: some turn sour, hopefully before too much damage is

(Continued on Page 14)

(Continued from Page 13)

done; others prove themselves worthy in time ... even yielding multifold, unanticipated benefits.

As examples of the latter, the establishment of standards affecting the height of bridges and width of roads served to encourage the freer flow of commerce and general traffic, without imposing counterproductive constraints upon the industries/technologies involved in their production and usage. Others, addressing the permissible levels of radiation emission from our TVs and microwave ovens, the presence of nitrites and artificial sweetening agents in our food and so on, have arisen out of a legitimate concern for our health and well-being. In these and other instances, government action is taken for proven or probable cause.

### Consider the Converter

On the other hand, the soundest motives on the part of government have brought forth goblins if not monsters. Consider the catalytic converter, a poor solution to a genuine problem, i.e., the pollution introduced into the atmosphere by automobile exhaust emissions. Millions of dollars (and automobiles) later, it appears to have been demonstrated that the imposition of the converter standard by government has led to the substitution of an even more toxic substance for the one that was to be controlled. Furthermore, it is reported that the catalytic converter standard seriously reduced gas mileage and automobile efficiency (by as much as 14% since 1967); and this at a time of growing shortages in the world's, or at least the U.S., oil supply.

My reasons for citing these examples of beneficial results of government intervention in the activity and substance of free enterprise in the first case, and malignant ones from overreaction in the second, do not include a need to prove that government makes mistakes; why belabor the obvious? Government has a very difficult job to do.

I am not even arguing that there are too many rules, however good or bad these may be (although the 60,000 pages of regulations recorded in the *Federal Register* as of 1976 might easily tempt one to do just that). But I believe it is not unreasonable to conclude that some regulation by government is both inevitable and desirable.

### Entertaining 'Spectaculars'

Musing ended. It is the thesis of this chapter that current governmental involvement in the U.S. computer industry is too uncoordinated, too tenuous and too variable in its depth to do either much good. Furthermore, the increase in public computer industry "spectaculars" suggests government action in recent years may have more entertainment value than real. Consider the following:

- After the Justice Department filed

suit against IBM, a federal judge called in the two litigants engaged in possibly mortal combat (that is, mortal for our industry) only to ask why they were there.

- It was finally noticed that the National Bureau of Standards (NBS), an agency truly containing some of our most skilled computer scientists, has had little success in standards definition, let alone implementation, in the computer industry. This is a self-evident truth, not even contested by

mental participation in our quest for better means to maximize the return on our DP achievements. But, as I stated above, the U.S. government has sent such inconsistent signals to the U.S. computer technology community as to what its true priorities are, or even as to whether these have been defined, that private industry's plans to exploit the waves of technological change crashing on the shores of our research establishments are being impacted while we wait for governmental

little more to support our main contention that current U.S. government involvement in our industry is generally not fully coordinated or thought out. That our argument also supports the anti-I/O standard position is almost incidental.

### Sea of Controversy

It is self-evident that government is obligated to consult those who are intimately in touch with the pertinent technologies prior to building fences around them. For example, in the case of the proposed I/O interface standard, the Brooks committee, whether right or wrong on this vital issue, does not seem to have been able to eliminate the sea of controversy surrounding it. Too many competent organizations within and outside government flatly disagree with it.

Furthermore, lengthy protests made by technical experts at great expense, and consuming many hours of research, have too frequently been answered with terse, imperious dismissals. Thus, the argument for the proposed I/O standard is steeped in enough controversy that those highly committed to a different route (e.g., IBM, HIS, Univac, Burroughs, NCR, DEC and CDC) may rightly view its imposition as an act which fails to credit the integrity of their motives.

With IBM itself against the standard - curiously, because it is one which IBM designed and which exists on most IBM equipment (e.g., 360s, 370s and the new 30XXs) - the other manufacturers with far less resources must be all the more wary of it.

Indeed, in the private sector, all of the large U.S.-based mainframe manufacturers (save Cray, Amdahl and ITEL) and most of the U.S.-based minicomputer manufacturers are against it. Those for it are essentially the U.S. plug-compatible manufacturers (PCMs) and the Cray, Amdahl and ITEL organizations.

Also not surprising is a high degree of "noise" from abroad, the purposes of which vary, but little of which we can assume to have been designed to benefit our industry.

Current estimates of support for the proposed I/O interface by U.S.-based private industry suggest the constituencies represented by both sides effectively give the anti-I/O standard group an overwhelming 10-1 advantage.

### Principle Not at Issue

Just for the record, no one is against the principle of this standard or against standards in general. Indeed, those parties in the Computer and Business Equipment Manufacturers Association (Cbema) who are most vocal in their desire to defeat the proposed standard let their position be known at the outset in such a manner as to betray their disbelief that such a standard could actually be taken seriously. It was only after their own seeming indifference resulted in their

### Chronology of I/O Interface Standard Development

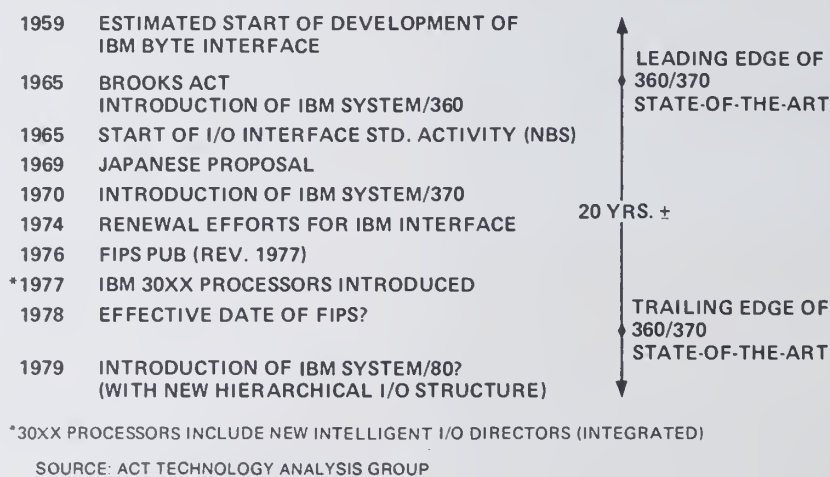


Figure 1

NBS. But the explanation given by many vocal spokesmen of why NBS could not get too much done seems to betray their preoccupations as being less with the technical aspects of the industry than with its promise as a vehicle to political stardom.

- The recent controversy regarding I/O interface standardization, an issue of major consequence to our technology, politics, psychology and economics, is so steeped in metaphor that the contestants cannot help but conclude that conspiracy is involved.

Less hypothesizing is needed to explain the anti-I/O position (at this time) than the position of those favoring the standard. Rep. Jack Brooks, who chairs the House Government Operations Committee and who heads the drive for adoption of the standard, seems singularly reluctant to solicit the opinions of our leading academic institutions and research organizations, not to speak of some of the leading and most scientifically oriented governmental bodies.

For example, to say the Department of Defense is for the standard when the Air Force is not raises questions as to whether the polled parties truly represent their constituencies. Anyway, in this whole affair, we cannot help but see a spectacular aborning.

We have already acknowledged the need, value and importance of govern-

clarification.

At the same time, the number of foreign manufacturers, many old and some new, subsidized wholly or in part by their governments, now able to afford the poker chip needed to enter the game for capture of the world marketplace, is on the increase.

With the dramatic, increasingly frequent technical breakthroughs in achieving high performance at low costs that are the rule these days, maintaining our own leadership role as the fountainhead of world computer technology is going to be increasingly difficult, if not impossible. Japan and underrated Germany have shown themselves to be no weak contenders, for example. We had better get our act together.

While almost any of the current U.S. government/U.S. private industry confrontations may be used to illustrate our problem, the I/O standards issue seems to capture the flavor of our thesis best. The discussion of this problem which follows is not intended to be all-embracing in its detail; within its technological and philosophical orientation the reader will detect any number of gaps and elisions. I say this to forestall the objections of those who may maintain that its bias, while intentional, is as defective as that of the Brooks committee.

At the same time, I believe it needs

being publicly labeled "against standardization" that they started to recognize the true gravity of the situation.

Their position today against the I/O standard is based upon many factors, including the relative youth of our industry. Swamped with change, they see the proposed standard as one of a type more applicable to a traditional industry, such as steel, transportation or even chemicals, all quite describable in terms of a large body of "knowns." DP doesn't really have a history of which to speak. The time of its most vigorous, concentrated growth is now and over the next few years; what earthly reason could there be for hobbling it with a standard that is already obsolescent?

Annual shipments of computer systems (all types) by 1980 are expected to reach the \$18 billion to \$20 billion level, with minicomputer shipments growing by 25%, microcomputers growing by 40% and "traditional," general-purpose maxicomputers growing by 12% to 14% annually. Computer-related innovations are flooding the market; very large-scale integration (VLSI), bubbles and charge-coupled devices (CCD), fiber optic ca-

bles, laser and inkjet printers, etc. In fact, these innovative products and ideas have been one of the major causes of the explosive growth of the DP market, and with increasing evidence that truly monumental changes to our technological beachhead — changes that can lead to as yet untold benefits for ourselves and others — are close at hand, many serious scientists are aghast.

The principle of standardization for economy, unassailable as it is, cannot be used to rationalize a possible U.S. retreat from a leadership role to a "planet of the apes" posture. Or has the continuing shortage of computer scientists become so acute that none of the imaginative, nonpartisan ones are available to referee the matter according to the established protocol for passage of a Federal Information Processing Standard (Fips) — which standard, incidentally, the Brooks committee wantonly abridges?

Or, not to be discounted, is the committee handling "other matters" relating to interagency conflict and Office of Management and Budget (OMB) procurement policies through the use of a procedure that accidentally vic-

timizes the computer industry?

Or is the Brooks committee visionary in its perspective?

Unfortunately, the primrose path is only seen from its terminus and I believe we may be on it now with regard to adoption of the I/O standard.

*Federal Information Processing Standards (Fips) are issued by the National Bureau of Standards. The Secretary of Commerce has complete authority to impose such standards (working with NBS) under the terms of Public Law 89-307 and Executive Order 11717 (38PR12315, dated May 11, 1973). Standards imposed in this manner become effective 90 days after publication.*

competitive considerations in the U.S. and still others that focus on international competition.

Two further classifications of the same (and other) arguments center upon the maintenance of our position as the wellspring of the world's computer technology and the role of individual governments in technology in an electronic era characterized by essentially continuous, globe-enveloping communications networks. With on-line, local public access to computer systems whose power includes the potential for retrieval and processing of information on a global scale, we are set up to perform all kinds of mischief.

The cryogenically entombed Josephson device, with the potential of as many as 10,000 IBM 3032s in processor power, could suck a nation's economy dry in a Japanese minute by tapping into its banking systems unobserved.

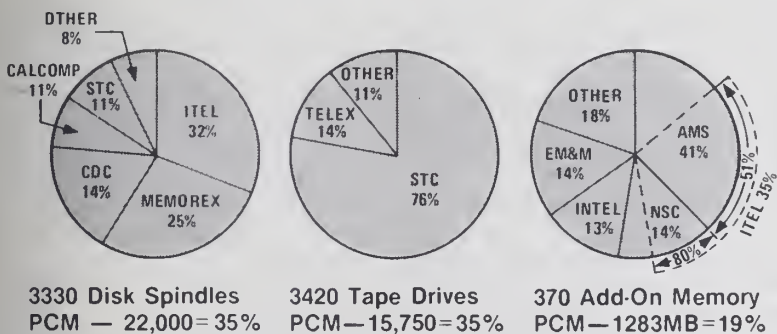
Cbema's position on the proposed I/O Fips has become a matter of public record. My own point of view substantially agrees with its arguments and fully agrees with its conclusion. The government's position is also a matter of public record. An encapsulated version of both follows a bit further on.

The proposed I/O interface standard defines the functional, electrical and mechanical interface specifications for attaching computer peripheral devices through their control units to DP systems. Since a detailed technical description of the standard can be acquired from IBM or Fujitsu, it will not be given here.

Of importance to us at this time is the  
(Continued on Page 16)

In any case, in addition to those arguments which are related to the youth of and accelerating waves of change in our industry, and the cries of conspiracy disguised by metaphor, the arguments against the standard's adoption as a Fips are substantial. Grouped in classes, they include those which are deeply technical, others which relate to purely commercial,

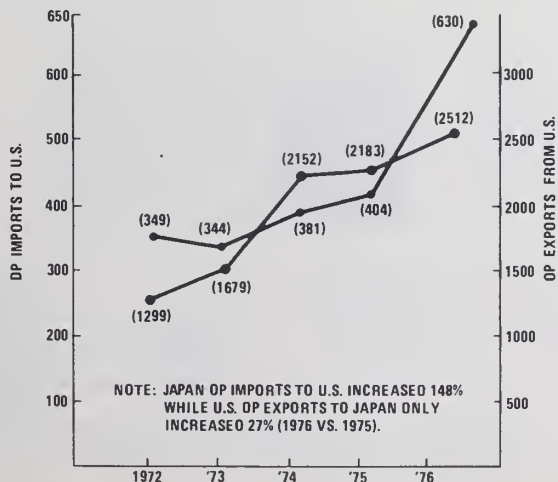
1976 PCM Market Penetration\*



\*U.S. INSTALLED BASE  
SOURCE: INTERNATIONAL DATA CORPORATION

Figure 2

U.S. Imports and Exports of Computers and Related Equipment (Trade Value \$ Millions)



SOURCE: U.S. DEPT. OF COMMERCE

Figure 3

Expected Hierarchical Storage Structures

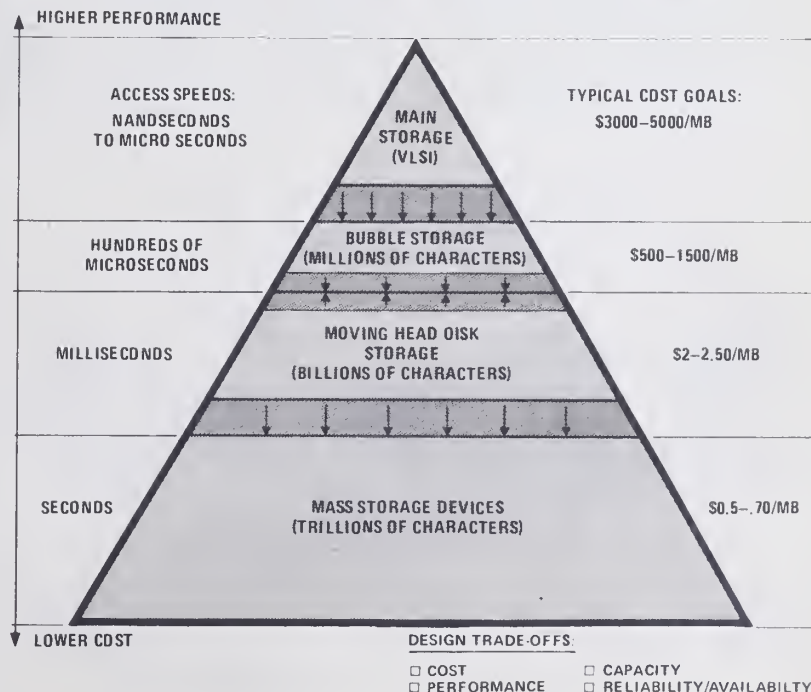


Figure 4

(Continued from Page 15)

principle. Let it suffice to say that no one views its 1.5M-byte (12M-bit) data transfer rate as visionary, given the current coaxial cable 3M-byte rates. While recent IBM announcements show an improved data transfer rate for its standard 370 I/O interface with out the use of advanced serial data transfer coaxial cable technology, this involves yet more engineering and associated software. Supporting one mud road between city centers and Concorde-supporting airports is bad enough; two is almost too much.

The watered-down version of the standard which suggests that all computer companies bidding on federal requests for proposals carry at least one 360/370 I/O channel has recently been the subject of a lot of controversy, with Rep. Brooks leading the faction dissatisfied with the status quo. The committee wants more (if not all) I/O channels provided to be of the 360/370 vintage. With fiber optic I/O cable connects supporting data transfer rates of 10<sup>14</sup> megabits, and with data communications bottlenecks on the brink of being overcome, one wonders whether the government's plan is to slow down our technological development and usage in some magnanimous gesture to foreign competition both within and outside the computer industry.

### Crucial of the Matter

The government's intent is "to minimize the cost of satisfying its data processing requirements through increasing its available alternative sources of supply for I/O peripheral subsystems, both at the time of initial system acquisition and when a system is modified through augmentation or replacement of I/O peripheral subsystems." Figure 1 shows the chronology of I/O standard developments and expected future actions.

The crux of the I/O interface issue is that the U.S. government wishes to re-

duce or eliminate the necessity of sole-source computer procurements. The Brooks committee claims to feel that such an I/O interface standard would increase competition and thus lower prices for all future computer peri-

plicated in its U.S. government base. In fact, it is estimated that IBM currently has only 30% of the federal government computer market, a figure which represents less than 4% of its corporate revenues. Even this share is

ment decisions specifying what government wanted these companies to support.

Now, it seems fair to ask why one branch of the U.S. government encourages more IBM compatibility, while another branch — the Justice Department — sues IBM for allegedly monopolistic practices.

Then, in view of the fact that many Japanese manufacturers are IBM plug-compatible, how can the U.S. government complain about Japanese electronics dumping and unfair competition while at the same time encouraging Japanese plug-compatible imports via the proposed standard?

### Looking at the Arguments

Let us summarize some of the political, technological and economic arguments for and against the proposed I/O interface standard. We will do this in the following form: testimony by A.G.W. Biddle, president of the Computer & Communications Industry Association (CCIA), before the Senate Antitrust Monopoly Subcommittee appears in *italics*; remarks which represent Cbema's position will follow. The CCIA and Cbema positions are assumed to reflect those of the House committee and the majority of our industry, respectively.

1. *The absence of standards can serve as an anticompetitive barrier to market entry.*

Since this remark is equally true and false, little can be gained from it. If Biddle means he can observe anticompetitive barriers arising and this is attributable to the absence of standards, evidence also exists to support a contrary view.

Many new firms have entered and are continuing to enter the dynamic DP industry each year. The Systems 77 conference recently held in Munich contained acres of hardware from all over Europe primarily (but from elsewhere, too). While most processors

### Current I/O Interfaces

| IBM             | PROPOSED STANDARD (CIRCA MID-1960'S)                                       |
|-----------------|----------------------------------------------------------------------------|
| *AMDAHL/FUJITSU | PROPOSED STANDARD                                                          |
| *ITEL/HITACHI   | PROPOSED STANDARD                                                          |
| CDC             | 1. PRODUCT LINE IS UNIQUE —<br>*2. PCM SYSTEM (IBM) USES PROPOSED STANDARD |
| DEC             | PROPRIETARY UNIQUE                                                         |
| NCR             | PROPRIETARY UNIQUE                                                         |
| BURROUGHS       | PROPRIETARY UNIQUE                                                         |
| HONEYWELL       | PROPRIETARY UNIQUE                                                         |
| SPERRY UNIVAC   | 1. SERIES 90 — BYTE ORIENTED<br>2. 1100 SERIES — WORD UNIQUE, PLUS BYTE    |

\*MUST REMAIN COMPATIBLE WITH IBM TO SURVIVE.

NOTE: CDC, DEC, HONEYWELL AND SPERRY UNIVAC (1100 SERIES) HAVE DIFFERENT INCOMPATIBLE CHARACTER SETS AND WORD SIZES VIS A VIS IBM/370.

SOURCE: ACT TECHNOLOGY ANALYSIS GROUP

Figure 5

pheral requirements or upgrades.

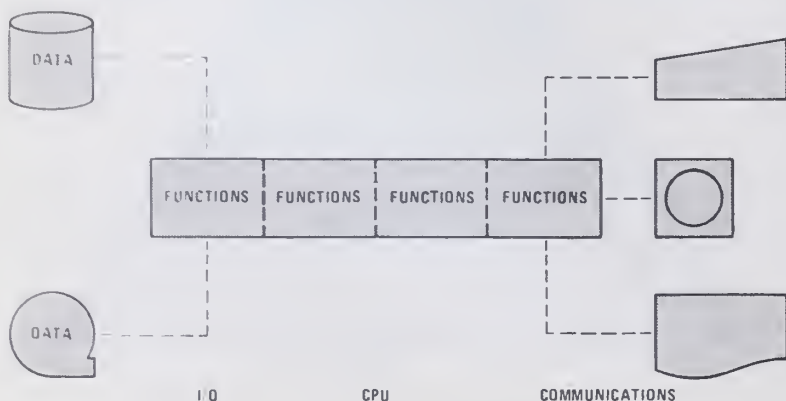
One of its important concerns involves the implications of attaining peripheral device mobility in its future hardware complexes. As we know, the software development requirement to allow such interchange of peripherals is so large that it is not unreasonable to suggest that its cost alone — as yet inestimable — may offset any possible advantages to be gained by passing the Fips.

Since the standard is based on IBM 360/370 system I/O, and since IBM controls such a large segment of the world computer industry, one might be tempted to conclude that IBM's market position worldwide is re-

declining.

This in itself may not be a compelling argument to negate the standard, but when viewed in conjunction with other facts it takes on additional importance. The U.S. government has traditionally been the place where innovation, if not subsidized, was at least encouraged. Univac, HIS and the rest of the "incompatibles" (in the proposed I/O standard sense) command fairly large segments of the federal marketplace. As we noted earlier, none of these produce large processors with the proposed I/O interface. In fact, much of the I/O interface design implemented on their systems was heavily affected by earlier, govern-

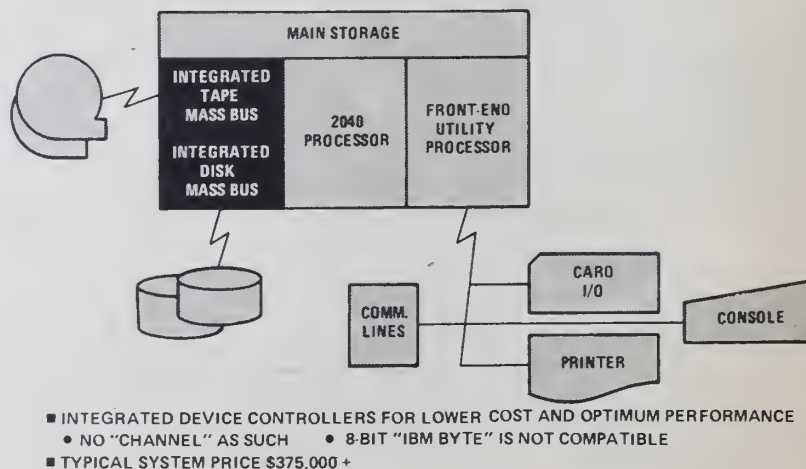
### Integrated Designs (e.g. DEC, IBM S/3, and Other "Small Scale" Computers)



SOURCE: ACT TECHNOLOGY ANALYSIS GROUP

Figure 6

### DEC System-20 Architecture 36 Bit Words (5 to 7 Bit Bytes & Parity)



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Figure 7

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90 Printing/Publishing/Other Communication Service  
95 Other

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| 22 | Director/Manager/Supervisor DP                                    |
| 23 | Systems Manager/Systems Analyst                                   |
| 31 | Manager/Supervisor Programming                                    |
| 32 | Programmer/Methods Analyst                                        |
| 41 | Application Engineer                                              |
| 42 | Other Engineering                                                 |
| 51 | Mfg Sales Representative                                          |
| 52 | Other Sales/Marketing                                             |
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there were in the mini category, I/O channels, controllers, devices, cables and protocols varied all over the lot.

Since IBM is said to control an estimated 60% to 65% of the worldwide market, an I/O standard could bring commensurate benefit to the industry leader, while hurting the smaller mainframe companies. The smaller firms would be forced to develop, support and maintain "IBM-compatible" I/O hardware and software on all major systems.

Furthermore, with the swift decline of our processor costs occurring at a rate roughly equivalent to the rate of growth of the minicomputer industry, some of our large mainframe manufacturers may be in more precarious positions than either we or they expect. IBM's need to fuel its growth with about two billion additional dollars per year in order to fulfill its corporate plan is no simple challenge to its management, given an environment in which cost and pricing formulas are changing before its very eyes.

Bright, new, innovative ideas are absolutely essential or the plans of all the large mainframes may be threatened by the marketplace confusion. It is no wonder that IBM is unwilling to reveal its I/O interface plans for the 1980s to anyone outside IBM.

Value-added communications, software, processors, channels, etc. will be the name of the game for survival. And one area that's been begging for improvement for a long time is the I/O interface.

2. A supplier (or suppliers) which seeks to lock in its customers opposes the development of standards which facilitate product (or subsystem) interchangeability.

This assertion, too, is as true as it is false. Customers become locked in a supplier at many levels and for various reasons: long-term financial commitments (three- to five-year leases or purchase and/or purchase options),

software lock-in (operating systems, data base, data communications, languages, etc.) people lock-in (the cost and time element involved in retraining a large staff on another vendor's equipment can be prohibitive), and so

posed IBM I/O-compatible standard would tend to further lock users in to IBM.

3. Lacking substantial economical motivation through customer refusal

The user management population is becoming increasingly sophisticated in estimating conversion costs, new facilities requirements, etc.

An I/O interface standard would force all firms that wish to remain in the federal government market to adapt to IBM specifications. Those whose product plans for the 1980s have already been launched would incur thereby a substantial cost penalty.

The smaller computer firms would be impacted the most, since the cost to adapt would represent a higher percentage of their total product cost.

4. There is no institutional mechanism to encourage private sector voluntary standards bodies to act in any but their own self-interest.

The natural competitive forces which exist have already caused various standards to be considered and created; e.g., Ansi 74 Cobol, a pending communications standard (X.25), a pending Codayl data base standard, card I/O, magnetic tapes and many more (Micr, Ascii, etc.).

Furthermore, large user groups such as Guide, Share, National Retailers Association, the Association for Computing Machinery (ACM), Association of Data Processing Service Organizations (Adapso), etc., have the power to demand standards. The first two are against the standard, citing obsolescence as a major concern.

5. In technology-based industries, consumer or general interest participants lack the necessary technical expertise to contribute. They have little choice but to take on faith the representations made by the suppliers' representatives.

First, the DP business is not, by and large, a consumer-oriented one, such as those involved in the manufacture of TVs, washing machines or calculators, so the issue raised by this criticism is not altogether germane.

(Continued on Page 18)

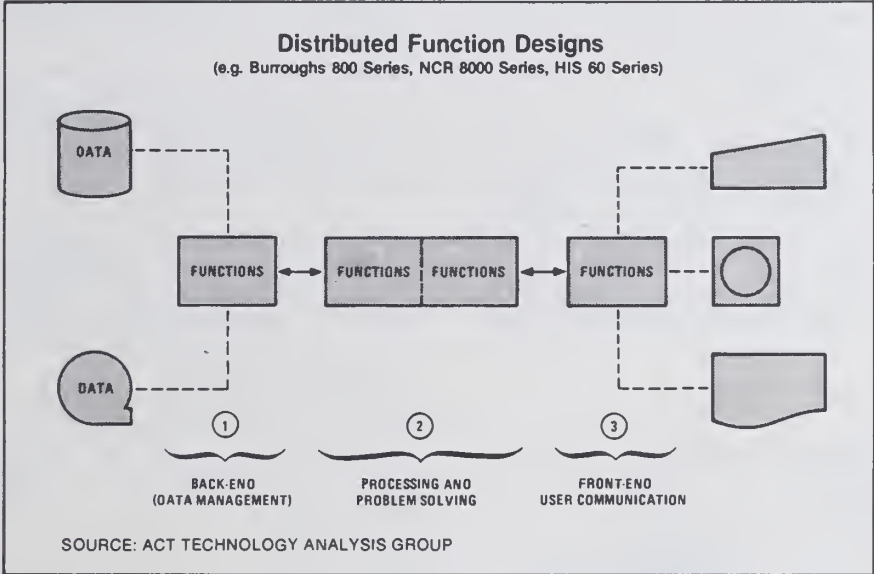


Figure 8

forth.

Moreover, creation of an I/O interface standard would not in itself facilitate product (or subsystem) interchangeability because of mainframe software/firmware differences, data format uniqueness (disks, diskettes) and device control logic incompatibilities. Applications maintenance activities would soar as programmer/analysts went back into their vast applications libraries to alter programs to accrue short-term hardware interchangeability improvements.

Occurring against the backdrop of swift innovation in devices, communications, etc., this could raise havoc. It also seems clear that the pro-

to purchase nonstandard products, there is little incentive for producers to develop meaningful standards.

This is completely false. The reverse situation currently prevails in the marketplace — customers demand standard compatible products (when upgrading or considering alternate products) or substantial performance/cost/function benefits to do otherwise.

From one perspective, therein lies the heart of the whole affair. Trade-off analyses which pit the ideas of bringing in new gear against extending usage of the old are routinely made by all DP managements, which would really like to continue to have a choice.

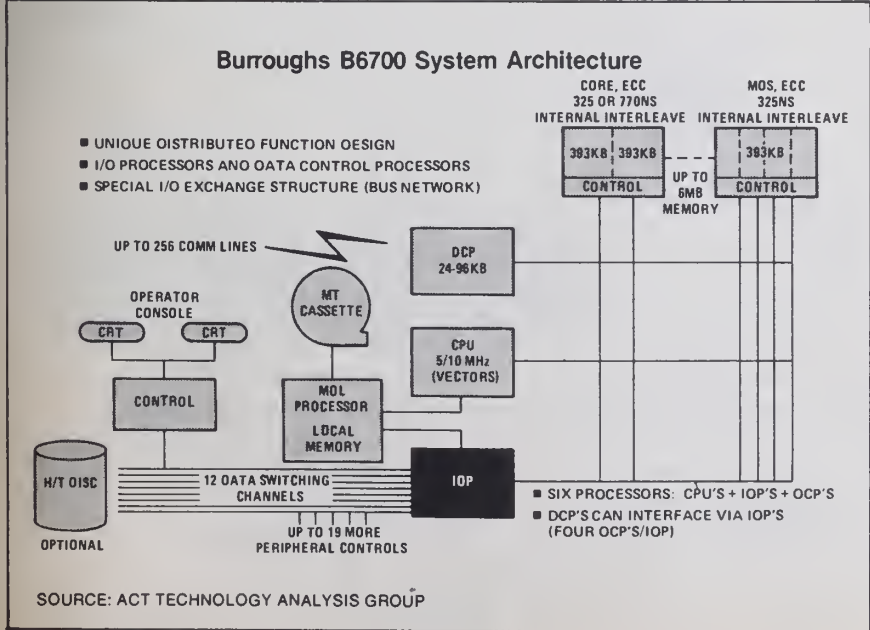


Figure 9

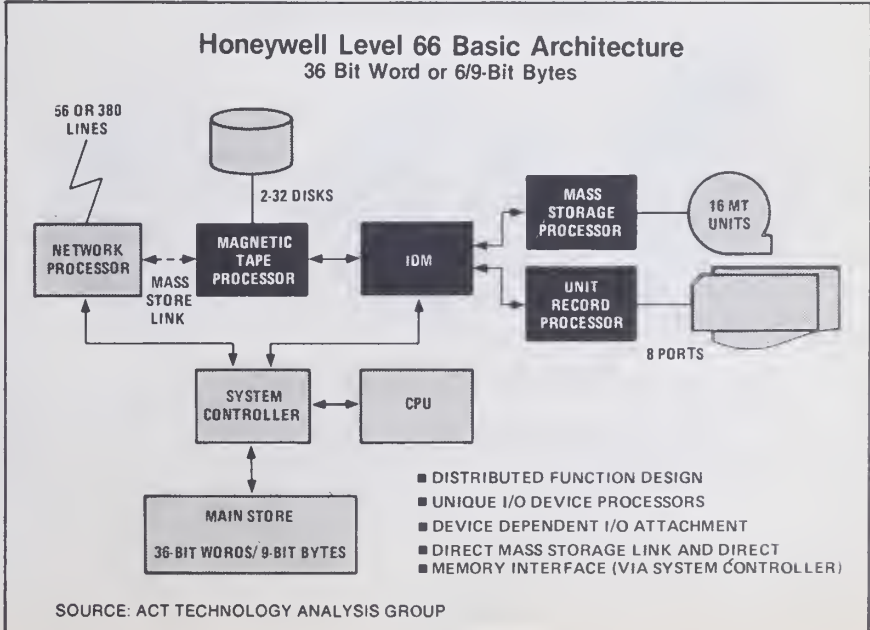


Figure 10

## IN DEPTH

(Continued from Page 17)

Second, many users today have lived through two or three generations of DP equipment, and as a result they are very experienced in both the technical and economic factors involved in their usage. The first-time mini systems users may be a concern (strangely, those systems were excluded from the standards coverage until recently). However, most are recipients of dedicated systems prepared by OEMs of mini systems (e.g., software houses) or else have access to software houses for help in all aspects of their work.

Remember, hardware is declining at a rapid rate as a percentage of the total DP environmental mix. And our country's DP services business is being entered in increasing numbers by the large mainframers to support their cash income requirements as their

hardware assets implode in value.

In this CCIA argument, some merit does exist. However, implicit in a concept of the future which envisions proliferation of systems throughout our society and in every area of endeavor, and which also makes no more demands of users in the area of technological know-how than is required of car owners today, is a need to recognize that slowing down the innovative process will not help to make that vision a reality.

The kinds of systems we have already require substantial expertise. Eliminating this requirement involves (among other things) altering current systems architectures to facilitate access to data being processed by the power we have available. The proposed I/O standard drastically limits the possibility of realizing this goal.

6. In a high-technology industry, the voluntary standards-making process lags behind the technology because of the inordinate time required to reach a consensus.

On the contrary, a high-technology, high-growth industry such as DP naturally has fewer standards precisely because of its high growth rate and fluidity. It is expanding at a rapid pace. Premature standards limit innovation.

However, even if we accept this assertion, the solution to the problem it poses rests more in speeding up the time to consensus rather than in slowing down the technology.

7. Industry participants resist the development of anticipatory standards for fear that such standards will restrict their available design options and may serve to disclose their product or marketing strategies.

Unnecessary standards based on obsolescent technology can/will seriously affect design trade-off options and may add substantially to overall product design, manufacturing and support costs.

But, as obvious as this assertion is, it does not address the main issue at all. You would have to be extremely unobservant not to notice that a literal blizzard of technological change in the computer industry has been taking place.

8. We do not, however, have standard higher level computer languages that permit a program written for one machine to be run without change on another's machine, nor standards for efficient high speed usage of computer/communications networks . . .

Standard languages do exist, such as Ansi '74 Cobol, Fortran and RPG-II (either official or so-called "de facto" standards). If we take the above assertion literally, it is absolutely incorrect.

It is true, however, that more often than not some changes are required; e.g., the user must recompile the program and/or make some modifications to job control steps.

This is essential since different computers have unique architectures (word size, instructions types, data formats, etc.). These differ for good and practical reasons too lengthy to debate here.

It would be unthinkable that we require all manufacturers to produce the same system. Moreover, such relatively minor changes can improve the applications performance significantly.

Today, all major manufacturers are collectively spending hundreds of millions of dollars to develop and support "standard" languages for different models or series of computers. Every new model is conceived as requiring that it fully support such standard languages if it is to be competitive and marketable.

This is a concept with which I disagree. It has been promoted by a seemingly unconscious dedication to continued proliferation of the programming tools of the early days such as Cobol, RPG and Basic and some new ones like PL/I. These will all soon fade away with only Fortran or Fortran-like facilities surviving because of their relationship to algebra as it is taught in our schools.

Higher level language standards would not by themselves solve the program compatibility or portability issue. Data base and data communications incompatibilities are far more complex and vital to this issue.

Standards for communications networks are currently under active consideration. Clearly, it would have been premature to impose communications standards on the industry prior to such recent technological developments as satellites, microprocessors or digital

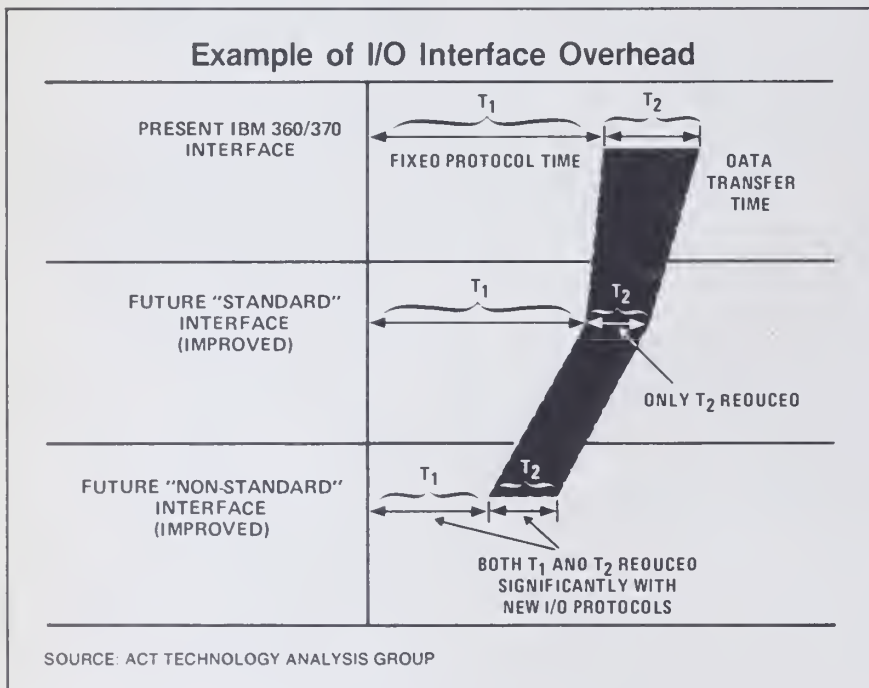


Figure 11

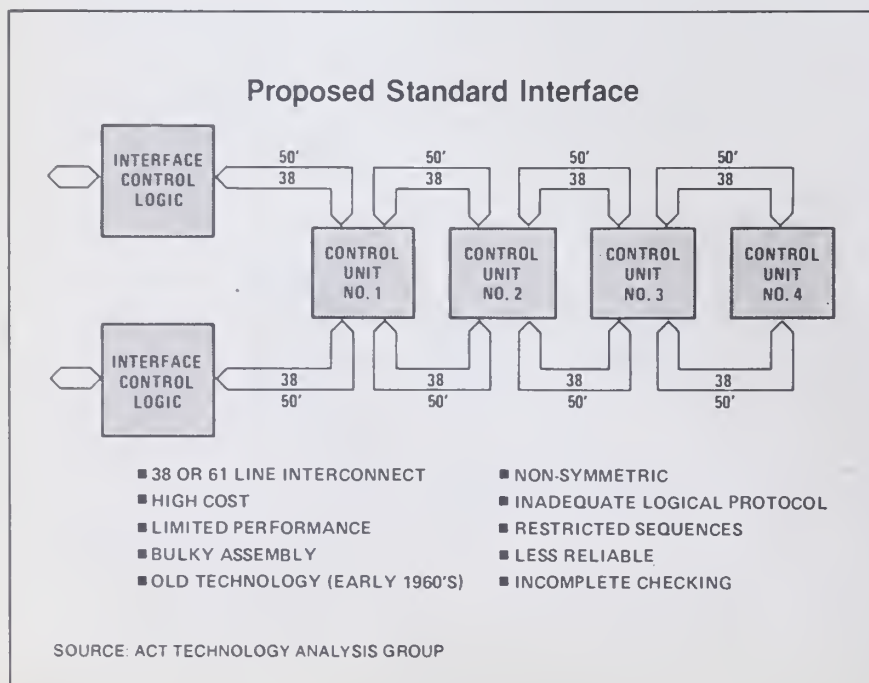


Figure 12

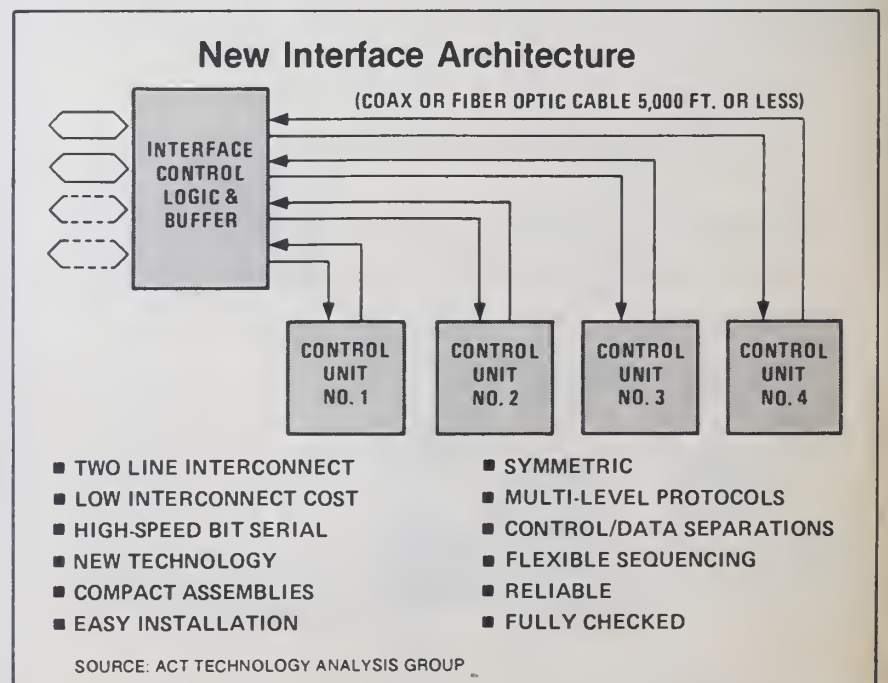


Figure 13

links.

Indeed, with AT&T faced with a possible \$30 billion write-off from equipment obsolescence and the corporation in a period of intense reassessment of its future options to fulfill its charter, we should pause to reflect on the meaning of physical standards.

While sustaining Justice Department inquiries and engaged in conflicts caused by sudden, large encroachments on its heretofore inviolate territory, one cannot help but conclude that AT&T is faced with the following, unanticipated phenomenon. As the waves of technological change increase in frequency along with a product cost plunge, decelerating the time periods of technological obsolescence, we suddenly find that driving the whole affair of production is *not* marketplace need, but force-feeding of technology to remain competitive.

Standards enactment could serve to slow this process to bring it in line with marketplace need, but other measures are better. With the marketplace expanding (and everywhere), stimulated by labor problems abroad as well as by a wider selection of product acquisition options, it seems a wanton act to slow down our computer industry to achieve this effect — if it is occurring.

9. Lack of computer industry standards costs the taxpayer hundreds of millions of wasted dollars per year.

Quantifying the amounts gained or lost by this requires the use of black art. In fact, premature, ill-considered standards based on obsolescent designs can cost hundreds of millions of dollars by seriously restricting technological progress in this fast-changing industry.

While lack of I/O standards *may* have cost the taxpayer million of dollars over the *past* 10 years, the imposition of an obsolescent standard at this date would be of questionable future

cost savings to the taxpayer.

10. Those seeking adoption of the proposed Fips (PCM firms principally) point out there is no evidence of any significant technological development taking place in the I/O interface area.

Future I/O storage subsystems (which should be introduced in or before 1980) will require a "hierarchical structure" where data automatically percolates upward/downward, from/to slower, less costly devices (e.g., magnetic cartridges or other media) to faster, intermediate and moderately priced devices (disks) and then to more expensive, very fast devices (CCDs or bubbles) using fiber optic cables and microprogrammed controllers (microprocessors).

This staging arrangement will require careful design trade-offs and highly integrated packaging to ensure cost-

effectiveness for the customer in terms of speed, capacity, reliability, flexibility (growth) and cost. Premature I/O interface standards could seriously impact these planned innovative, progressive ideas, to the detriment of the user.

11. To contend that its adoption will stifle progress is also a red herring. Its adoption serves to put the I/O channel on the table for all to see and work with (PCMs). Also, standards can be modified in accordance with advances in technology.

It is unreasonable to ask the major computer manufacturers, which have collectively spent hundreds of millions of dollars on developing I/O hardware, system control software and firmware, to give the PCMs their plans, drawings, specs, etc. And, according to the government's require-

ments, if the Fips were passed, it would require that future product designs needed to bid on federal procurements be revealed.

It just doesn't make good sense to reveal innovative product designs to foreign competition, not to speak of competition at home, before they are ready for announcement and production.

Typically, it takes five to six years to develop a major, new, advanced technology computer line. Many manufacturers, therefore, are already committed to designs which may be introduced by 1980. To require that these designs be altered at this late date would create an enormous, unfair burden on the firms involved.

In addition, the modification of the proposed I/O standard to adapt to newer architectures and technological improvements is not practical, since such change would necessarily trail hardware/software development by at least as many years as Biddle suggests voluntary standards enactment may take.

12. The opponents contend that the implementation of the I/O channel will be excessively costly to both manufacturers and users. Studies by the National Bureau of Standards indicate the standard can be implemented on existing CPUs at a cost of \$7,000 to \$40,000 each, using black box adapters.

While the hardware "black box adapters" may represent a relatively small cost increase for some manufacturers, the software change and support costs required to achieve actual I/O compatibility for operating applications seem an incredibly high price to pay. Needless to say it will significantly affect final user price.

In addition, the final purchase price must reflect hardware manufacturing cost, software and support cost, main-

(Continued on Page 20)

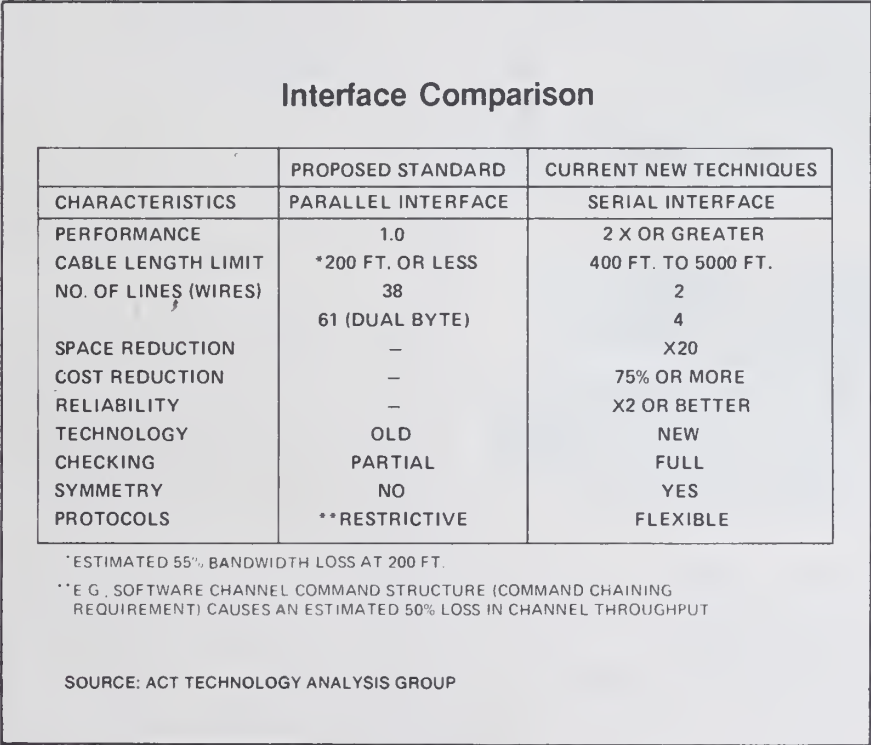


Figure 14

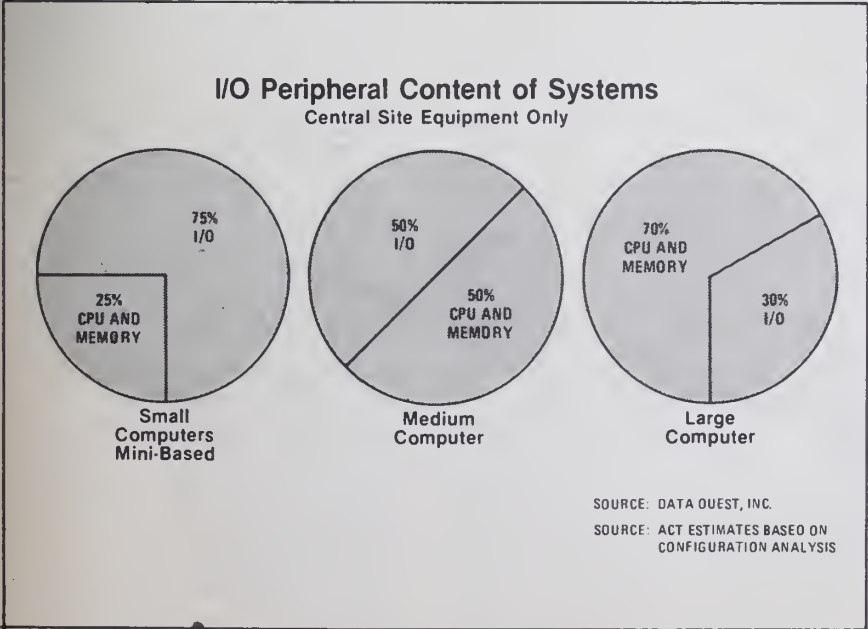


Figure 15

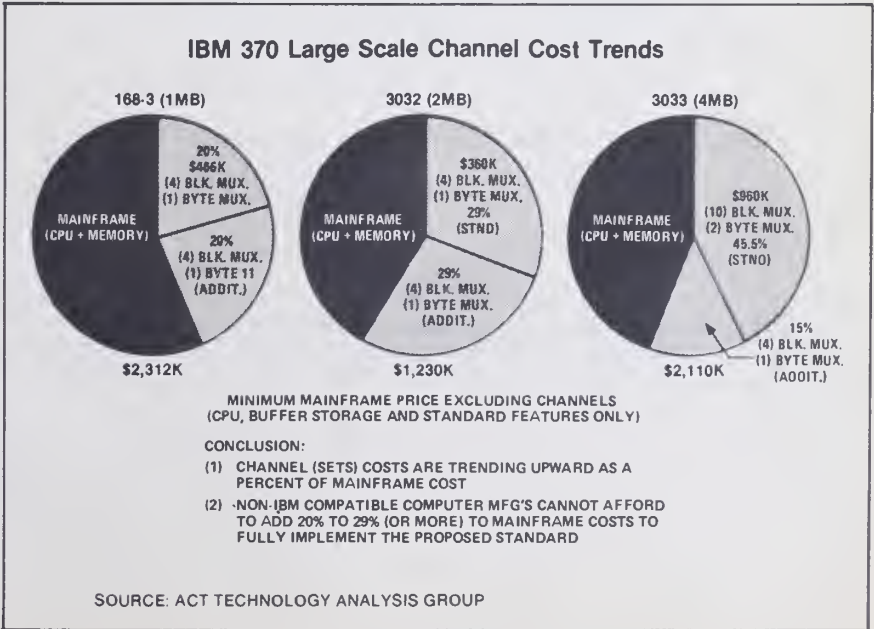


Figure 16

(Continued from Page 19)  
tenance, overhead and profit, and it will present a large percentage of final system price depending on the size of the computer and number of "black boxes" required.  
The adoption of this I/O interface standard may force most computer manufacturers to unbundle the channel logic and software handler development support cost — thus cancelling out any potential saving.

Finally, where does one draw the line — while \$7,000 to \$40,000 plus all the above "other" costs may (although I doubt it) be acceptable at the "high end" of the computer spectrum (IBM/370/168 or 3033 or equivalent competitor models), this extra cost may mean the difference between product profit or loss at the "low end."  
13. The CCIA proposed an addition to Section 102(b) 2 of the bill: "Where

two or more units, devices or subsystems are functionally or physically separate and distinguishable one from the other, but must be joined together or interconnected to perform their intended function, and alternative

they challenge the capability heretofore reserved to the host computer systems of the middle to large ranges. Interconnection and interface will become more a matter of convention and principle of manipulating physical en-

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|                                           | W/D STND      | WITH STND | W/D STND   | WITH STND              |
| A. MAINFRAME COMPLEX (CPU, MEMDRY, POWER) | .45           | .50       | .25        | .27                    |
| B. I/O CHANNEL SETS                       | .20           | .20       | .15        | .15                    |
| C. I/O INTERFACE STND (EST. ADDIT. COST)  | —             | .10       | —          | .10                    |
| D. I/O SUBSYSTEMS (LOCAL EQPT. ONLY)      | .35           | .15       | .25        | .10                    |
| E. I/O SUBSYSTEMS (PCM DISCOUNTED)        | —             | .15       | —          | .10                    |
| HARDWARE TOTAL                            | 1.00          | 1.10      | 0.65       | 0.72                   |
| F. MAINTENANCE CHARGES                    | .12           | .12       | .14        | .16                    |
| G. CURRENT SYST. SFTWARE                  | .05           | .05       | —          | .05                    |
| H. NEW SYST. SOFTWARE                     | —             | —         | .10        | .10                    |
| TOTAL COSTS                               | 1.17          | 1.27      | 0.89       | 1.03                   |
| EXPECTED PERFORMANCE                      | 1.0           | LESS?     | 2.0-3.0    | DEGRADED SIGNIFICANTLY |

SOURCE: ACT TECHNOLOGY ANALYSIS GROUP

Figure 17

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sources of supply exist, or in all probability will exist, standards for the proper and efficient interconnection of the device shall be provided ... Interconnecting standards will define the physical, mechanical, electrical, optical, or other conditions necessary to ensure the efficient, safe, and workable interconnection of the units devices or subsystems."

This totally ignores the software issues: (1) Interconnection without firmware (microcode logic) or software compatibility is useless; (2) Firmware/software device control handlers are part of the operating system and must be developed, supported and protected by the computer manufacturer:

- To avoid data security breaches.
- To insure proper operations and reliability/maintainability.
- To maintain optimum performance.
- To provide future compatible growth to newer, more advanced (cost-effective) products.

And we now come to perhaps the most disturbing of all issues. It strikes at the very heart of the matter when considered outside the domain of the arguments pro and con cited above.

The very concepts of "component" or "subsystem," even of I/O itself, are dramatically changed and still changing. Some I/O functions are moving outbound (timing clocks, buffers, logic), while other functions are being integrated within the central electronics complex or CPU. Some channel computers or computers contained in intelligent controllers are becoming increasingly powerful to the point where

titles. Indeed, when the next generation of computer systems is introduced by 1979-80, one may legitimately ask where the "mainframe" (or CPU) is.

The mainframe logic/arithmetic and control circuits (function) will have been distributed within the central electronic complex and/or network in order to improve performance, function, cost, reliability and security.

The PCMs have been doing well lately as the market penetration chart in Figure 2 indicates. We would be remiss in not noting that part of their success may be traced to their "free ride" on the system software of mainframers with whose products their own products connect, thereby releasing them from the obligation of funding heavy software development.

Moreover, many PCM firms import peripheral or computer-related components or subassemblies from Japanese manufacturers which enjoy the benefits of a relatively cheap labor force and are substantially subsidized by the Japanese government.

In fact, Japanese imports to the U.S. have increased 148% between 1975 and 1976 (see Figure 3). And now it appears that the U.S. government is prepared, perhaps without fully understanding the implications of the course upon which it has embarked, to stimulate yet greater foreign imports by effectively forcing the subsidizing of PCM activity via the proposed I/O interface standard.

In addition, this would appear to cause an underwriting of Japanese OEM and PCM activity by compelling all the computer manufacturers to pro-

## Proposed I/O Interface Standard — Summary and Conclusions

- OBSOLESCE TECHNOLOGY AND ARCHITECTURE
- ANTI-COMPETITIVE FOR SMALLER FIRMS
- COSTLY TO DEVELOP AND MAINTAIN
- SERIOUSLY LIMITS SYSTEM PERFORMANCE
- INFLEXIBLE DEVICE SHARING
- INHIBITS INNOVATION
- COULD AFFECT U.S. LEADERSHIP AND EXPORTS
- MAY INCREASE FOREIGN (JAPANESE) IMPORTS
- INADEQUATE RELIABILITY
- UNNECESSARY — ALTERNATIVES EXIST
- DENIES FEDERAL GOVERNMENT FUTURE I/O TECHNOLOGY BENEFITS
- QUESTIONABLE COST-EFFECTIVENESS:
  - APPLICATIONS SOFTWARE IMPACT?
  - SYSTEMS SOFTWARE IMPACT?
  - HARDWARE VS. UNBUNDLED COSTS?
  - GOVERNMENT INSTALLED BASE PROFILE?
  - SHORT VS. LONG RANGE IMPACT?

SOURCE: ACT TECHNOLOGY ANALYSIS GROUP

Figure 18

vide one to four already Japanese-compatible I/O channels and interfaces as well, thus adding cost to U.S. manufactured computer systems while lowering costs for domestic and foreign PCM firms.

Leaving the business competition and economics arenas, let's examine a few technical factors:

- Computer memory cost improvements have been most impressive in the past and will be even greater during the next few years. CCD devices with 65K-bit densities are already in production today, and 262K-bit chips are expected by 1980. Disk recording densities have improved significantly from less than 5M-character capacities in the early '60s to over 500M-characters today. These are expected to double again by 1979.

These credible technological innovations and improvements will require not only higher speed channels, but also new architectural approaches (as shown in Figure 4). The proposed I/O standards cannot effectively handle these new devices, higher data rates and more efficient I/O structures (see Figure 5).

- "Small" computers usually have integrated designs to optimize performance at the lowest cost. Thus, back-end I/O functions and front-end communications functions time-share the basic CPU logic, buffers, etc.

In contrast, "large" computers must optimize for highest performance; therefore, the backend and front-end functions are distributed to off-load the CPU (see DEC, Honeywell and Burroughs computer system examples).

"Medium-scale" computers typically represent compromise designs or a partly distributed design trade-off. Each manufacturer must be free to optimize and explore new approaches.

Government interposition of an inhibiting standard which would be costly to implement and support, re-

duce performance and increase system and operational complexity seems strange at this time. Note in Figures 6-10 that many vendors also have character sets or word sizes which are incompatible with the 8-bit byte; the software/hardware overhead associated with handling this "foreign" byte structure is very high.

Furthermore, how would the proposed I/O interface work in a distributed network of computers or nodal processors — some of which do not need I/O peripherals or only limited, special I/O devices? Does it make sense to force this interface (and its related cost) on all future processors?

- The block multiplexer, byte multiplexer and selector channels implied by the standard are obsolescent when evaluated in the following terms:

1. Protocol overhead (request/acknowledge/byte transfer/etc. sequence) fundamentally limits the bandwidth of the channel. Future high-density disks and CCDs could not attach to this early 1960s "plug" without significant performance penalties (see Figure 11).

2. I/O software path lengths could increase up to sixfold, thus reducing performance and needlessly consuming additional main storage.

3. Duplicate sets of channels (the primary and proposed standard) would be inflexible and restrictive in that separate I/O subsystems would be required, with the added problem of system load balancing.

4. The proposed standard is bit parallel, half-duplex (38 lines or more), less reliable and more costly vs. more advanced serial I/O interfaces (see Figures 12 and 13).

5. Computers which have other than 8-bit byte designs would be required to convert data constantly during I/O operations — thus adding substantial overhead to all software I/O functions.

- The standard is less reliable because more lines (wires) and handshaking (protocol) are required (Figure 14). In addition, failure in one part of the daisy chain affects the total chain (ripple factor).

Moreover, error correction is not part of the standard as proposed.

Finally, forced coexistence of old and new I/O structures would compromise future data security and system integrity requirements (Figure 15).

Concluding the I/O interface issue, we return to economics for the following, final note. ACT's Technology Analysis Group (TAG) looked at the current pricing structure for the IBM 3032, 3033 and 370/168-3. Its conclusion was that IBM 30XX channel costs are high and increased relative to the older 168-3 on a percentage basis (see Figure 16).

If these I/O channel prices have some relationship to IBM internal costs (hardware and software), then the other computer manufacturers are being asked by the Brooks committee to

add from approximately 20% to over 29% to their mainframe costs. Obviously this represents a very substantial burden which would drive some firms out of the federal government business — thus reducing competition and ultimately increasing user costs.

The bottom line economic analysis (see Figure 17) dramatically illustrates the false economics of the position of the government or of those who would support the proposed I/O interface standard. While one may argue a few percentage points plus or minus about our large-scale system scenario, it seems impossible to avoid concluding that the standard at best would not save the government users any money; at worst, it could, in fact, cost the taxpayers 10% to 20% additional by 1980.

Finally, and most important, the economic scenario does not consider the essential costs associated with changing the thousands of applications software programs which would be required to use the obsolescent I/O channel standard.

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# Editorial

## One Small Step for Privacy

The bill calling for a Federal Information Practices Board, recently introduced in the House of Representatives [CW, Nov. 14] is a small step in the right direction — but only that.

True, the board would take responsibility for assuring that federal agencies are complying with the Privacy Act of 1974 — a job now vested in the already overburdened Office of Management and Budget. But without further legislation, the board would have no authority to deal with matters in the private sector.

The organization described in the legislation introduced by Representatives Edward I. Koch (D-N.Y.) and Barry Goldwater Jr. (R-Calif.) — a starting point for discussion, they admitted — could turn out to be an impotent paper-pushing organization rather than the effective data protection authority envisaged by the now-retired Sen. Sam Ervin and the original privacy protection architects.

As described, the board would not even have the power to monitor the "voluntary compliance" that organizations in the private sector have suggested as the solution to the occasional privacy abuses their recordkeeping practices engender.

Second, U.S. firms providing domestic data base services for access by foreign companies stand to lose a good deal of business if these

domestic firms are unable to meet the data protection requirements now being discussed and implemented by other nations.

The data protection authority would be the mechanism for assuring U.S. cooperation with foreign data protection laws or an international convention that protects the privacy rights of foreign citizens whose data is being processed within our borders.

The Council of Europe, in its draft International Convention on Data Protection, described the data protection authority as the body that would coordinate and investigate complaints on behalf of foreign nationals. It would also assure that governments and foreign businesses in each country where data is processed comply with the laws that prevail in the nation where the data subject lives — or the country where the data is registered as domiciled.

The data protection authority was watered down by those well aware of the political realities that prevail at this time. Indeed, if the President can't convince Congress that there is an energy crisis or that a federal consumer protection agency is needed to protect the health, safety and pocketbooks of the buying public, how can Congress be expected to see the need to protect something as vague as personal privacy?

## Data Past

**Five Years Ago**  
Nov. 22, 1972

YORK, Pa. — A jury here ruled that a salesman's promises, even if made only orally, could be binding if they were made to clarify vagueness or generalities in a contract. Observers saw this as jeopardizing the validity of thousands of "standard" contracts.

In the breach-of-contract case, a user sued Burroughs Corp. because of problems in implementing accounting applications on a small system.

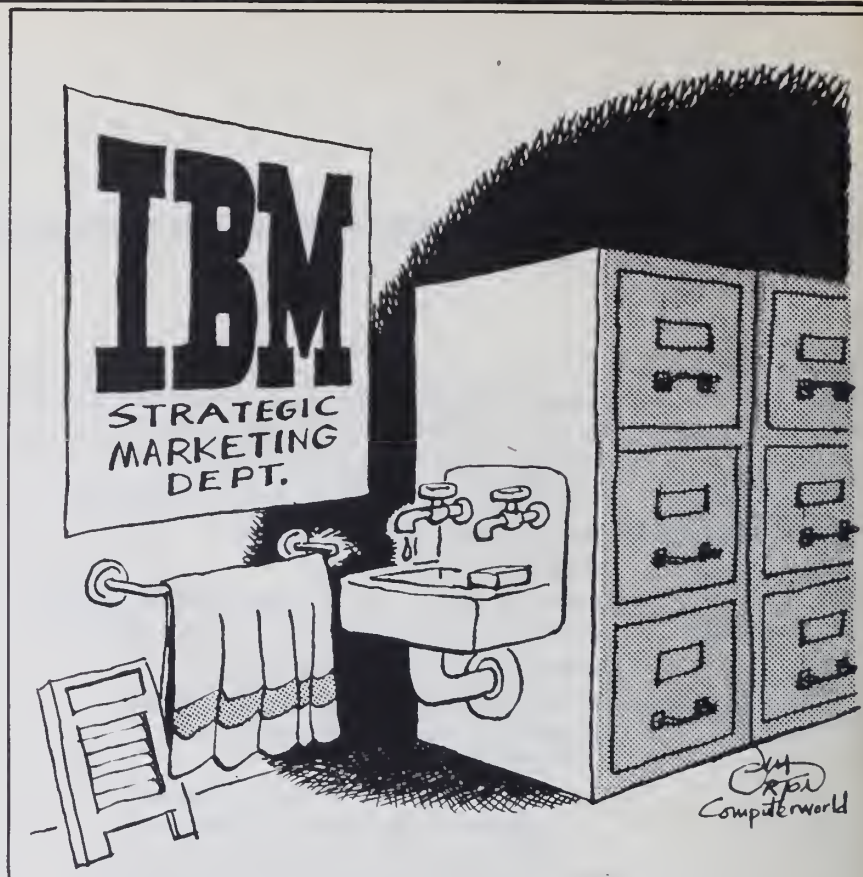
WHITE PLAINS, N.Y. — IBM announced compatible subsets of the OS-based Information Management System (IMS), the Vancouver Data Language-One and Data Language/I-DOS/VS. The packages provided data base capabilities for conventional 360/370 DOS installations.

**Eight Years Ago**  
Nov. 26, 1969

LOS ANGELES — An IBM expert told the Los Angeles County Elections Security Committee here that while it theoretically would be possible to tamper with the counting of election ballots under the IBM Votomatic system, security measures, testing procedures and the complexity of the system make rigging "virtually impossible."

William Kanaga said the system would have to be tampered with during the card-to-tape phase or during the compilation run.

LAS VEGAS — The financial position of the Association for Computing Machinery (ACM) was improving, it was reported at an ACM Council meeting here. George Glaser, Council treasurer, said the ACM position had been improved by about \$43,000 since the previous June.



## Letters to the Editor

### Editorial Rubbish

In the editorial "The Real World" [CW, Oct. 31], you argue that the announcement of new IBM processors is proof of IBM's "power in the computer marketplace."

"In a truly competitive industry," the editorial concludes, "the other manufacturers would constantly offer products and price improvements and wouldn't wait to play 'follow the leader.'"

To subscribe to that theory, one has to accept that:

- Competitors other than IBM seldom or never offer new products with better price/performance, except in reaction to IBM.

- IBM seldom or never has to react to the announcements of competitors through improved products and better price/performance, but does so anyway.

That is rubbish.

J.R. Young  
Vice-President  
Communications

IBM  
Armonk, N.Y.

tional sovereignty, economic viability, tax revenues and postal, telephone and telegraph authority monopoly policies. Many of the techniques and procedures being proposed for the ostensible purpose of protecting individual privacy happen to be rather effective tools for many of these other dangerous factors.

The U.S. information industry proposes that governments take the time required to study and understand these interrelationships so that legislation can be developed and enforcement procedures created that will provide protection to individual privacy, but avoid these related and dangerous factors.

Perhaps the future of journals like *Computerworld* will depend upon developments in this area.

Alden Heintz  
Vice-President  
International &  
Corporate Operations

Tymshare  
Cupertino, Calif.

### Almost Like Richter

Your expressed intent to establish a CPU rating system meaningful and fair to all should certainly be supported by all users ["Apples and Oranges," CW, Oct. 24].

With a multitude of variables to measure and ways to describe these measurements, you must feel as Richter did when he developed a system to describe earthquakes.

I feel a base configuration of equipment could be chosen from any leading vendor and that universally compatible exercising software could be written. When a run time had been established for that hardware, it could be assigned index 1.00. All or any other configurations and vendors could also be evaluated and assigned a positive or negative index.

Walter B. Campbell  
Minot, N.D.

### Potential Pandora's Box

The editorial "U.S. Out of Step on Privacy" [CW, Nov. 7] unfortunately treats only the simplest and easiest consideration of the data privacy protection issue. There is no real dispute about the need to protect the rights of privacy for individuals. The U.S. information industry is, and has been, a practicing proponent of this. The tough problem is how to provide privacy protection for individuals without invoking a host of other serious new difficulties.

It is perhaps unfortunate that information and the control of its movement is intertwined with many potentially dangerous factors such as censorship, trade protectionism, cultural homogenization, national power and control, na-

# Last Responses to Litman

## More Pros and Cons on Requiring Degrees

By Jack Stone  
Special to CW

Here is the final column of reader commentary on Regina Litman's letter [CW, July 4] dealing with the question of the need of employers to have DPs with college degrees.

M.S. Bump, DP manager for Du-Quoin Packing Co. [in Illinois] extended Litman's explanations as to why employers may prefer degreed people. He wrote: "First, employers are aware that a great many more college graduates exist today than, say, 10 years ago. So why not hire an individual with the educational background as well as the experience?"

"Second, one of the benefits of a degree is exposure to a number of subjects... to broaden the perspective... Doesn't it follow that such a [degreed] staff is probably, on the average, more promotable, more innovative and more adaptable?"

"Third, Ms. Litman has offered a number of alternatives that could be substituted for a degree, all of them very good. But wouldn't such substitutions require an inordinate amount of screening to assure that acceptable standards are being met? And isn't it more effective to specify a degree rather than attempt to establish alternatives to a recognized standard?"

"No doubt there are some companies... that feel only a college graduate is capable of doing [DP] work... This is snobbery in its worst form!... [Actually] I sym-

pathize with Ms. Litman. I have been in the computer field since 1955 and have repeatedly encountered exactly the same closed door. I don't have a degree and have seen many advertisements for positions I felt sure I could handle, but for which I couldn't get an interview because of the degree requirement."

### Postmilitary Experience

James Shannahan, a data systems programmer with Lockheed (in Sunnyvale, Calif.) described his job-hunting experience after leaving military service. "... I found the degree almost a universal requirement [for an outside hire]... I found several employers who viewed the degree as... evidence of a person's ability, but did not find any employer who related the degree to the work to be done."

"My experience... has been that having a degree will not do all that much for you other than get your foot in the door, but not having one will certainly hurt you."

"Could the answer [to recruitment] be a probation period where the applicant is provisionally hired for a short period?"

Leonard Jagoda, DP auditor with Blue Cross/Blue Shield of Georgia/Columbus, related the degree to management potential. He stated: "... Users are becoming more educated... To satisfy the user requirements and meet high professional standards, the programmer analyst that can compre-

hend these needs has a distinct edge."

"... A college education provides much training in management skills that are needed in today's business world. Granted, extended expe-

## The Human Connection

rience can be very beneficial to businesses in the short run and training costs can be minimized; but, firms do not hire only for today — they must prepare for tomorrow."

The subject of educational attainment as a measure of competence was addressed by S.J. Haremza, DP manager for Roblin Steel (Tonawanda, N.Y.). He said that "Criteria need to be established for (DP) professional positions on the whole... I am sure there are people who would make good doctors or attorneys who are not practicing medicine or law because they do not have a degree... Would Litman want one of these... people operating on her or representing her in court?"

Robert Hoberman, director of educational services for Insko Systems (Neptune, N.J.), takes the non-degreed position. "... Actually, there is very little support for the attitude of requiring college degrees for programmers... Unless the college graduate is trained in

some field which he can apply to an applications area, most of his college education will tend to be superfluous..."

"From a personnel viewpoint, a college degree may in fact actually be a negative qualification for programmers. The turnover of graduate programmers has been consistently higher than that of college dropouts or high school graduates. The reasons are reasonably simple:... Much of... programming involves mundane maintenance chores and a degreed programmer is often made restless... People with degrees tend to think well beyond their current jobs... and people with degrees in a personnel market requiring degrees tend to have inflated views of their abilities and worth."

"On the other hand, the college dropouts... and high school graduates... seem to have a lower self-perspective and a great deal more staying power..."

Hoberman's viewpoint is supported by this note from a reader overseas who offers his "Observations based on experience: There is no clear correlation between having a degree and productivity. Many degreed people create ways of thinking that often are counterproductive."

William S. Turner III,  
B.A. M.A. Ph.D.

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

## But Costly to Customers

# Some 'Errors' for Sake of DP Convenience

The automatic charge feature provided by the Merchants National Bank of Allentown, Pa., is much like many other such options provided by banks around the country. It provides a check-protection system that comes in handy at the end of the month when small checks may push the checking account balance into the red.

This happened recently to Ronald Krikorian, a reader of this column, who would have gone \$13 into the red on Aug. 15 if it were not for such an automatic transfer of \$50 to his account. So far, so good.

One of the system's characteristics is that the due date for this "Instant Money" is selected by the depositor. Krikorian had selected the 15th of each month. On the day prior to the Sept. 15 due date, he repaid the loan in full plus 49 cents interest. That was, obviously, Sept. 14th. In fact, he had only used \$14 for one day, \$26 for two days before normal deposits had brought his checking account back into the

black. However, interest on the whole \$50/mo was due and was paid. That should have ended the transaction — but it didn't, as Krikorian found out when he got his next statement.

The Merchants National statement showed that although the due date for the instant money was the 15th, the bank had withdrawn a partial payment of \$10 — from Krikorian's account on the 14th. Moreover, when the full balance had been paid, meaning that now the bank had received "instant" money from its depositor, it was just left sitting there and not returned to his checking account.

A month went by. In October, another statement arrived that showed another 41 cents "finance charge" on top of the eight cents shown on the September statement. The \$10 was still in the Instant Money account. Krikorian subsequently changed some banking arrangement and informed me of his experience.

### 'Inside' Story

From the inside, the story significantly differs in point of view. The bank apparently puts priority on its own computer cycle rather than the calendar date when it establishes "due dates." Despite

the date printed on the statements — "Due Day — 15. — and the bank's agreement with its customers, the due date the bank uses is based on when it ran the prior cycle — and it then allows 25 days!

Effectively, the bank was running on a 360-day-year calendar and pulling five days action from all affected customers per year. This was "Error" No. 1.

Its second error was in setting up the dates to see that while the customer might occasionally find himself one day off on due dates, the bank would not have the same problem when it came to taking money out of a customer's account for any reason. The withdrawal of \$10 from Krikorian's account on Sept. 14th was not — as I had expected — a Sept. 14 mistake in not processing Instant Money payments before assessing the amounts to be taken out.

In fact, it was not a Sept. 14 transaction at all, although labeled as such. The bank had determined the previous day, Sept. 13, to remove the cash the next day without even considering whether or not there would be any need to do so when the due date arrived. Again, this is only a one-day difference but if universally applied, that can add up to a lot of money.

It also adds up to a lot of cost in

another way, however. When these small errors are "one-sided" people won't see them as errors.

In this, they are quite right. As the appropriate person in Merchants said to me: "This is the way we calculate due dates. Don't you think it is right?"

It was wrong, but he seemed surprised that I didn't think that DP convenience outweighed a calendar and the printed output statement.

The public's perception that the apparent "errors" may not be errors at all but actually reflections of policy is correct.

As a result, the grass roots objection to the spread of automation — and with it the opportunity to make similar profitable "errors" — can be expected to continue, as evidenced in the dissenting portion of the report by the National Commission on Electronic Fund Transfers [CW, Nov. 7].

So the public/industry split will grow to a chasm, and into it will fall various opportunities for valuable new applications which need popular support, but won't get it until we are even-handed in our programming.

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### The Taylor Report

By  
Alan  
Taylor  
CDP

## Basic Motivation

I would like to comment on the article "Newkirk Calls Motivation Real Job of DP Manager" [CW, Nov. 7].

Behavior theory is pretty clear these days about the idea that people are not motivated by others. They motivate themselves. I would propose that the role of a really good manager is not to see people as needing motivation, but as needing a leader who will clear away the blocks to their doing

their jobs well. This point is poignantly highlighted in the letter to Jack Stone [CW, Nov. 7].

The way most managers seem to try to "control," which is one of the classical concepts of a manager's function, is by reward and punishment, as Newkirk pointed out.

The scientific literature on reward (better known as

reinforcement) and punishment suggests that neither is really effective in human relations. The only way that "reward" works as a "motivator" is if the person being rewarded is in a state of deprivation with respect to that specific reward.

Thus, if money is to be a motivator, then the employee must perceive himself as underpaid. While this may make money a motivator, it also makes for one angry and frustrated employee, who will indeed "equalize the situation."

On the other hand, punishment certainly does not alter behavior; it merely defers it to another time. Thus, when a goal is not met, and "the employee or team [is] punished in some way," that will also make them angry and frustrated and cause them to set out to "equalize the situation."

I believe the successful manager is one who is seen by his subordinates as a person who goes out of his

way to remove the roadblocks to success. We should realize that one of the great rewards of work is being allowed to do one's best and being appreciated for that.

Herbert A. Seidman  
San Mateo, Calif.

## Dispersing Incompetence

Having been so impressed with *Waves of Change*, I was disappointed to read the comments of Charles Lecht at the Systems 77 conference [CW, Nov. 7]. Assuming accuracy of quotation and validity of interpretation of his remarks, his prediction of the early demise of distributed DP (DDP) from the disease of "distributed incompetence" is based on questionable premises.

Granted that a lunatic fringe of the user community will jump into an ill-advised and indiscriminate embrace of DDP, most users will plot their courses carefully.

In many, if not most cases, the result will be a hybrid network of facilities encompassing the strongest elements of each mode of operation, centralized and distributed, based on the business function needs of the individual enterprise.

In the insurance industry, for instance, distributed processing is a logical answer to distributed business problems such as policy quote and issue, claims handling and even underwriting.

The shortcomings of host-driven terminal technology are not merely functions of host equipment cost. They are largely the result of overwhelming complexity of central hardware and layers of mediocre operating systems software together with the delay and failure potentials of heavily exercised communications components.

Such ills are not likely to be cured by more and cheaper centralized hardware.

Lecht's vision of platoons of incompetent technicians perpetrating mischief at corporate outposts is hardly realistic. Aside from growth, which will occur regardless of processing environment, DP function is being distributed, not added.

One or more languages may have to be learned, but it is the central staff of designers and programmers who will supply and manage the application tools for the field as well as those functions which properly remain at the large central

host complex. It is unfortunate that the discipline and quality control which will be required have been so rarely exercised in traditional DP operations.

Lecht's assessment of IBM's stance on DDP should come as quite a shock to the Systems Communications Division. I'm sure it was not aware that the 3790 line is merely a temporary marketing gimmick to tide it over the DDP "fad."

Lee R. Prescott  
Lebanon, Conn.

## No Laughing Matter

Joe Rigo's "hip-shot" attack on certified DP professionals was not funny ["Grasshoppers vs. Ants," CW, Nov. 7]. Its effect is libelous.

After 13 years of demonstrated achievement, I am now self-employed as a consultant in DP. I have held the Certificate in Data Processing (CDP) since 1968, have maintained my knowledge and expertise in the "state-of-the-art" to the best of my ability and continue to abide by the CDP code of ethics.

Potential clients, especially those unsophisticated in the use of computers, may be influenced by Rigo's comments to exclude my services from consideration. Such a situation would result in a financial loss to me.

Rigo's diatribe may not only affect the consultant's income, however. It could also have a negative influence on the employment market for anyone who uses the CDP designation in a resume.

Rigo demonstrated his attitude toward the commandment "Thou shalt not bear false witness against thy neighbor" when he identified (by inference) certificate holders with the Aesopian grasshopper, when he stated the Institute for the Certification Professionals (ICCP) was set up "to sell certification exams" and when he ascribed pseudo-arguments to the target of his insults.

The Data Processing Management Association (DPMA) originated the certification program as a means of furthering its goal toward professionalism in DP. I am unaware of any deviation from that goal by the ICCP.

Robert R. Cromer  
Dallas, Texas

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

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- Audit trails for all transactions must be provided by the system and archived by the user.
- Checks and balances for data integrity must include at least those of a manual operation and must be reviewed by the user.
- Recovery from Data Base corruption must be fully supported by the system and understood by the user.
- Recovery from Data Base destruction must be fully supported by the system and understood by the user.
- The utilization of the computer as a limited resource must be supported by the system and managed by the user.
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- The Data Base design must permit new master files to be appended as enhancements with relative ease.
- The Data Base design must permit extensions to the record structures of the master files with limited or no implication to existing programs.
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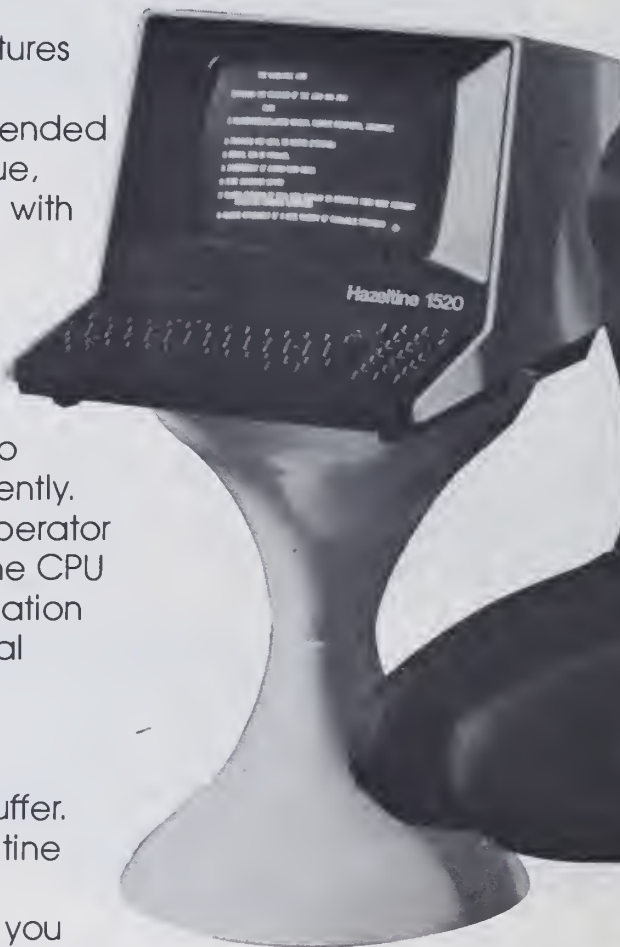
The Hazeltine 1520 uses two microprocessors, one dedicated to the terminal functions and one for the printer interface, allowing your CPU to interact with the terminal and printer independently. What does this mean to you? It means that an operator can be entering data through the terminal to the CPU while the printer is receiving and printing information from the CPU totally independent of the terminal function.

## Printer Buffer

The Hazeltine 1520 has a separate 2K printer buffer. Data communicated from the CPU to the Hazeltine 1520 printer interface at high baud rates are buffered down to the printer's speed. This allows you to attach a low-speed and perhaps low-cost printer to a high-speed communications system.

## Transparency

The Hazeltine 1520 permits data to flow through from the CPU to the printer without any change. You are not limited to formatting printed output, in accordance with the CRT display (typically limited to 80 columns).



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## NCR Test Site Reports:

# VRX Puts Programmers Into High Gear

ATLANTA — On-line program development is helping the Atlanta Housing Authority (AHA) accelerate its applications programming schedule to the point where "we will achieve more during the next two years than we did the past five," according to Keith Bates, the authority's assistant director of finance for data processing.

The AHA is a customer verification test site for NCR Virtual Resources Executive (VRX) operating system, which makes on-line program development possible.

The authority has 11 computer analysts and programmers. Tenant accounting, maintenance and general ledger systems it developed are used by housing authorities across the country.

AHA acts as a service bureau for several other authorities. NCR 8200 minicomputers and NCR 7200 terminals are used to transmit information to AHA via telephone for processing.

AHA has nine major systems under development, each embracing 10 to 20 individual programs, Bates said. Overhaul of its on-line general system has been

allocated 3,600 man-hours of development time.

Often programs to produce special reports or to incorporate tax changes must be developed on short order. So productive use of programmers, time and turnaround speed are important, he stressed.

On the other hand, he added, "If on-line program development were the only advantage offered by VRX software, I still would have jumped at it. We have also gained virtually unlimited memory. Our operators are more productive. Key punching jobs have been eliminated. Disk storage is used more efficiently, and we have increased processing speed."

### Chopped Into 'Pages'

As its name implies, VRX supports virtual storage. Main memory is only a small portion of addressable space. Programs are divided by the system into 1K "pages," which are usually stored on disk, to be brought into main memory individually as the logic is needed, Bates explained.

Built-in priorities let the software juggle processing times

so main memory can be fully utilized at times when several programs run simultaneously.

For example, if AHA is running a typical five-job mix on one of its NCR Criterion 8570 CPUs, VRX makes 8M bytes available for each program — a total of 40M bytes of virtual memory. Without VRX, only the computer's 640K bytes of actual memory could be tapped.

Last June, when AHA became a test site for VRX, it also upgraded its equipment. The authority had previously had an NCR Century 251 with 16 NCR 657 disks.

Today it has two NCR Criterion 8570s, each with 640K main memory, plus a dozen of the faster NCR 658 disks which provide storage of 1.2G bytes.

With the old equipment and real-storage software, AHA needed more than six hours to run its maintenance work-order program. Now the identical program is processed in less than four hours, Bates said, crediting the increased speed to both VRX and the more powerful hardware.

"In this case, for approximately a 10% cost increase, we gained in

the neighborhood of a 50% in production," he noted.

### Morale Booster

On-line program development also improved department morale and the productivity of programmers and operators, according to Bates. Programmers no longer complain about compilations being postponed when other jobs are given priority, operators aren't interrupted by programmers, who no longer require computer room access, and a keypuncher has been freed for other duties.

Since VRX locates files, they don't have to be placed on specific spindles; this saves operator time. Also, two nonrelated files can be placed on the same disk, resulting in more efficient use of peripherals, Bates said, citing other benefits.

### Links to Projects

About 50 NCR 796-401 and 796-101 CRT terminals link programmers and accounting and project supervision personnel located in AHA's main office and individual housing projects with the Criterion.

"With this network and the inquiry capability made possible through Cincom Systems' Total and Query Data Base software, any of our authorized personnel can inquire interactively into our data base, thus enabling them to operate with up-to-date complete information," Ernest C. Jackson, executive director of the authority, said.

AHA's conversion to the NCR Criterion and VRX was "painless," Bates added. The peripheral equipment was simply switched from one system to another, he said.

NCR's VRX will be available on a controlled release basis through the remainder of 1977 in cities where support is available. It is expected to be a general release in early 1978.

## 'Fsort' Handles Larger Files

LEXINGTON, Mass. — A major upgrade of a fast sort running under the Digital Equipment Corp. RSTS/E operating system, Fsort3 can sort blocked record files directly, according to the vendor, Evans, Griffiths & Hart, Inc. (EG&H).

The enhanced utility is also able to handle far bigger sort runs than the earlier versions, which were limited to 65,400 key records, a spokesman noted.

Fsort3 is compatible in important respects with DEC's RSTS-11 sort package, he said, adding that Fsort3, for example, accepts key files and "Type 1"

files with or without headers.

It also contains modules which can be substituted for DEC's SQWIK and MQWIK facilities, he added.

The EG&H package accepts combinations of the following types of keys: ascending and descending Ascii, ascending and descending integer; and ascending and descending floating-point numbers.

Fsort3 is up to 40 times as fast as DEC's utility, according to stand-alone wall time comparisons, and up to 70 times as fast in CPU time comparisons, the independent vendor claimed. It can

sort as many records or keys as an RSTS file can hold, the spokesman added.

The heart of Fsort3 is said to be a 4K machine-language runtime system installed under RSTS/E (Version 6B or later), which may be used with jobs whose user area is as small as 7K or as large as 28K, depending on conditions under which it is run.

Fsort3 costs \$2,500 for a single CPU license, which includes update services and warranty for a year. OEM and quantity discounts are available, the company said from 55 Waltham St., Lexington, Mass. 02173.

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# Independent Has Spitbol Compiler for PDP-11

OAK PARK, Ill. — A Macro Spitbol compiler for Digital Equipment Corp. PDP-11 minis has been announced by Dewar Information Systems Corp. The Macro Spitbol language is identical to Bell Telephone Laboratory's Snobol4 "with only some minor exceptions," according to a Dewar spokesman.

The DEC-oriented compiler is a full-blown Spitbol, he quipped, noting that the Dewar package is not a subset of the IBM 360/370-based version of the language that has been available for some time.

Spitbol is a string-processing language with "excellent pattern recognition facilities," he claimed. With that basic focus, it should be very effective in many business-oriented DP

tasks; it is not designed for "scientific" number-crunching work, he added.

## Instructions to Order

The macro facility enhances the language's usefulness since it allows the user to create instructions unique to his situation, the vendor noted.

Most Snobol4 programs will run un-

der Macro Spitbol with minor modifications, subject to PDP-11 memory constraints, he noted.

The Dewar software will initially be released with interfaces to the RSX, RSTS, Unix and Duress operating systems. Under RSX, Macro Spitbol is a 32K task while under Unix and Duress it can be split into separate data and in-

struction segments. This would provide a 32K data element, the spokesman said.

The Macro Spitbol license costs \$750 for commercial users and \$550 for educational and nonprofit institutions. Quantity discounts are also available, Dewar said from 221 W. Lake St., Oak Park, Ill. 60302.

## 'CA-Sort' Performance Enhanced

NEW YORK — Computer Associates, Inc. has released an updated version of its CA-Sort package for IBM DOS, OS and VS shops. Release 78 is said to have "significantly" improved sort performance, I/O manage-

ment and flexibility.

The improved performance was brought about by several features, a spokesman explained.

The sort itself has been fine-tuned for VS operations through use of

monitor systems, he added.

Full support of Model 3350 disks, as provided by IBM's DOS/VS Release 34, has been built into the appropriate version of CA-Sort Release 78.

Optimum work devices assignment through internal resolution of work I/O conflicts is still another enhancement for DOS users working with Release 78, he added.

The Sort Reentrant Access Method (SRAM), a highlight of the earlier CA-Sort, is included in the packaging for DOS sites but is a separately priced option for OS installations.

The DOS and DOS/VS version of CA-Sort Release 78 costs \$5,500. The OS version for "stand-alone" single sort operation costs \$5,050 while the SRAM option would add another \$2,200 to that license fee.

Monthly leases are also available, the spokesman said from 655 Madison Ave., New York, N.Y. 10021.

## 'Edpep' Courses

### Back User Needs

WELLESLEY, Mass. — A series of courses sponsored by Babson College and QED Information Sciences, Inc. will be offered over the next 10 weeks at the Babson campus here. The courses are open to DPs generally as well as the members of the Electronic Data Processing Education Program (Edpep) under which they were developed.

Edpep is supported by almost 30 corporations and government agencies, largely in the Boston area, as a means of pooling resources to get better training than would be available to them individually. A council of member representatives meets periodically and determines what courses are most needed. The member organizations fund their employees' attendance at the courses.

Opening the courses to nonmembers is a recent change, an Edpep spokesman noted. "Public" tuition for the courses is \$125/student day, he added.

A four-day course on "Leadership — Managing and Motivating People" will start next Monday, Nov. 28. A week later "Structured Design and Programming" will be the subject of another four-day program.

The final 1976 offering will run Dec. 13-16 and be a data base design workshop.

"Programming Strategies and Tactics" will make up the agenda of a three-day course from Jan. 16-18 and a systems analysis workshop has been scheduled for Jan. 31-Feb. 3.

Further information is available from Phyllis Tibbetts, Edpep Registrar, School of Continuing Management Education, Babson College, Wellesley, Mass. 02157.

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## 'Look' Extended for MVS, Also Gains Option for TSO

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) has enhanced Look, its real-time performance monitor for IBM OS and OS/VS installations, by adding several MVS-related features, improved displays for existing Look commands and a pair of separately-priced options.

Two new commands are keyed to tracking the Auxiliary Storage Monitor (ASM) and System Resource Manager (SRM) facilities within OS/MVS. Other related features include commands that dynamically control the actions of the SRM, ADR said.

### Two Options

The optional extensions of the package provide, in one case, more extensive analysis of the performance data captured by Look than was previously available and, in the other, tracking of the use of IBM's Time-Sharing Option (TSO).

The Extended Performance Analysis (EPA) option extends Look's long-term measurement potential by providing summaries, line graphs and histograms for better perspectives on system performance, the spokesman explained.

## Package Supports Use Of Array Processors Plugged Into Minis

NEWTON, Mass. — Computer Design and Applications (CDA) has a program development package for its MSP line of programmable array signal processors, which plug into Data General Corp., Digital Equipment Corp. and Interdata Corp. minis.

The software is written in Fortran and includes a symbolic assembler, a simulator and a programmable read-only memory (Prom) formatter.

The symbolic capabilities of the assembler make the microcode more readable, a spokesman explained. The simulator provides a high degree of reliability, he claimed, because it emulates the logical flow of data on the printed circuit board, down to the component level.

The software is free to users of CDA's processors but can be purchased by others for \$9,900. Courses in programming techniques will begin shortly, the spokesman said, and will be held at company offices, 375 Elliot St., Newton Upper Falls, Mass. 02164.

"In recognition of TSO's role as a major resource consumer," the spokesman said the Look TSO support includes analytical features to identify the percentage of CPU time used by TSO and the percentage of time available to the background partitions. It also shows the average swap loads in each region and the number of available buffers, he said.

The basic Look package ranges from \$4,800 to \$6,000 depending on the user's environment. The EPA option costs an additional \$3,600 while the TSO Support adds \$1,000. Monthly payment plans are also available, ADR noted from Route 206 Center, Princeton, N.J. 08540.

## 'Receivables' Run on 8080

HOLLIS, N.Y. — An interactive accounts receivable system designed for use on an 8080- or Z80-based microcomputer with floppy disks and a hard-copy printer has been introduced by Synchro-Sound Enterprises (SSE).

Written in an extended Basic, the software supports file maintenance, query and reporting functions, according to a spokesman. This support includes creation, modification and deletion of customer records and processing of transactions to be posted against the files, he said.

The system creates a history file of charges, credits and payment records for audit purposes. Payments can be against a particular invoice but if none is specified, the money

will be applied to the oldest one outstanding in the customer's file.

Support for interactive inquiries about individual files is another feature of the package, he said. A batch-oriented reporting facility includes preparation of monthly statements, an aged accounts receivable list and delinquency notices.

The vendor generally sells a hardware/software combination that costs "less than \$10,000" and includes a microcomputer, the software, a CRT and a Centronics Data Computer Corp. or Okidata Corp. printer.

SSE is at 193-25 Jamaica Ave., Hollis, N.Y. 11423.

## This is an ad for Xerox computers. (But not from Xerox.)

It's from Telefile Computer Products. And we've taken this space for two reasons:

First, we're a Xerox computer user and like the others, we believe in the mainframe. Price/performance is second to none.

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If you don't have a Xerox computer now, look into one. System architecture is remarkably advanced and in such tune with the software that users claim the computers deliver up to 95 percent of capacity. Unheard-of efficiency.

Tying the package together are two state-of-the-art operating systems: Control Program-Five (CP-V) and Control Program-R, for Real-time (CP-R). CP-V provides simultaneous access five ways: real-time, time-sharing, multi-programmed batch, remote batch, and transaction processing in any combination. CP-R is ideal for more dedicated engineering, scientific or real-time applications.

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And that's all the more remarkable since Xerox hasn't built one in years.

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It's a new industry being pioneered by Telefile. Applying latest technology, we revitalize computers so they can do more work faster. It may mean faster memory or peripherals. Or simply "black boxes" that extend a computer's capability beyond previous design limits.

Take Xerox. Since early 1975, when our ad appeared, Telefile has announced over 24 new Xerox-compatible products.

Compact main memory, high speed printers, communication processors, solid state RAD's, array processors, and on and on.

Most have powerful performance, reliability, and cost advantages over the Xerox units they replace. More important, they're available.

Recently, we announced a new mass store facility that brings "Winchester" disk drive technology to Xerox users—something previously available only to IBM users.

Telefile has even taken over complete system maintenance at some sites. Our service network now stretches to over 20 cities and it's growing monthly.

And now to give Xerox users room to grow, Telefile is embarking on the development of two new micro-programmed Sigma mainframes for introduction in 1978. One will run four times faster than Xerox' biggest machine, yet cost only about half as much.

That's computer enhancement. To Xerox users it means a way to take their computer investment and superior software into the 1980's in style.

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# Who Cares About the Forgotten Old End User?

By Robert J. Bergstrom  
Special to CW

Not to be forgotten midst the great technical and intellectual debates concerning structures and administration of data bases is the man who makes it all possible — the Forgotten Old End User (FOE).

The FOE does not care a great deal about the structure of the data base. Hierarchies remind him of corporate superstructures or governmental bodies. The network approach — no matter how rational or well-thought-out — is not within his normal frame of experience, consisting as it does of webs of lines interconnecting dots for mysterious reasons. The newer relational structures sound more promising, but a closer look reveals even

more complications than the others.

The FOE quickly realizes the knowledge required to decide which type of structure to use, let alone how to apply that structure to his data requirements, is not within his scope of business or recreational activities. Furthermore, the subsequent management of that mass of data does not require his attention. While he recognizes the need to add, delete and change elements of data, he has no need to participate.

All of these realizations are positive — not negative — if understood and placed in perspective.

## Input Essential

The FOE will not (or at least should not) be involved in either structuring

or administering a data base, whether it is a major corporate information system or a more simple special-purpose data base. His inputs to the process are essential — what information does he have, what would he like to have, how does he alter it, how does he use it. All these elements must be taken into account by the expert who designs the data structure and the administrator who subsequently manages it.

What does the FOE need to become a friend? (Find a Reasonable Incorporation of the End user Needs for Data!) For a FOE to take advantage of the work put into the construction and maintenance of a data base, he must be able to access the information he needs and display it in some understandable form. The important aspects of the

system are thus retrieval (selectivity), sorting (meaningful rearrangement) and reporting (simply and clearly).

Those data base management (and data management) systems that have been designed to accommodate these seemingly "simple" requirements in a manner clearly understandable by a nontechnical end user provide opportunity for substantially higher return on the investment in installation.

The remote computer service (RCS) vendors have traditionally had two major concerns in the development of software — efficiency of operation (to minimize costs) and customer ease of use (to maximize revenue). Some of the products available on these networks are impressive results of efforts to enable the users to access data easily and precisely.

For the most part, the RCS vendors operate with specific data bases, rather than a massive, interconnected corporate system. The reasons for this approach are basic and sound — the sales cycle is relatively short, the installation can be almost immediate, and customer satisfaction with actual use closely follows the decision to go ahead.

Many special-purpose systems exist that efficiently deal with public data bases in the economic and securities areas. These were designed from experience with user activities and effectively conceal the technical aspects in a conversational environment. The next step was to provide a more generalized system that could be used with a wide variety of data — both public and private (or corporate) data bases. The aspect of real value to the end user is the retrieval and reporting system — either as an integral part of the data base management system or as a stand-alone system that can interface with an established base of data.

Three areas of major importance are addressed in an understandable form by these user-oriented systems — selection, statistical extracts and reporting. In combination with inherent logical arithmetic functions, the end user has great facility opened to him directly — no need for technical assistance to answer his questions.

For example, to find out the names of female employees in New York who are in upper job classes, how about:

```
SELECT SEX = 'F' AND LOC =
'NY' AND JOBCLASS GT '14' or
LIST IF SEX IS F IF LOC IS NY IF
JOBCLASS EXCEEDS 14
```

To find out how many employees or  
(Continued on Page 32)

## This is an ad for Univac computers. (But not from Univac.)

It's an unsolicited testimonial from Telefile Computer Products. And we've taken space again for two reasons:

First, for sheer number crunching and handling of large data bases, Univac computers are in a class by themselves (how else could they thrive under a quarter century of IBM competition?).

Secondly, there are hundreds of older Univac installations that could benefit significantly from Telefile's computer enhancement capabilities.

Key to Univac's success has been its evolutionary approach to systems design. The new 1100 Series machines are direct descendants of the Univac 1108, first installed in 1964 and still running strong.

But as 1108's and other models have grown older, remarkable evolutionary advancements in memory, peripheral and mass storage facilities have grown up around them. One way users could upgrade was to change out the mainframe into a gleaming new model. Univac makes it easy by keeping the software compatible.

Think of Telefile as being *counter-evolutionary*. We reverse the tides of time by applying new memory and accessory design to computers hobbled by the past.

Take our new fully compatible add-on memory for Univac computers. By taking advantage of latest technology, it runs faster, takes up less floor space, and runs on only one-third the power of the Univac memory it replaces. No software changes are required. And costs are cut about 70 percent.

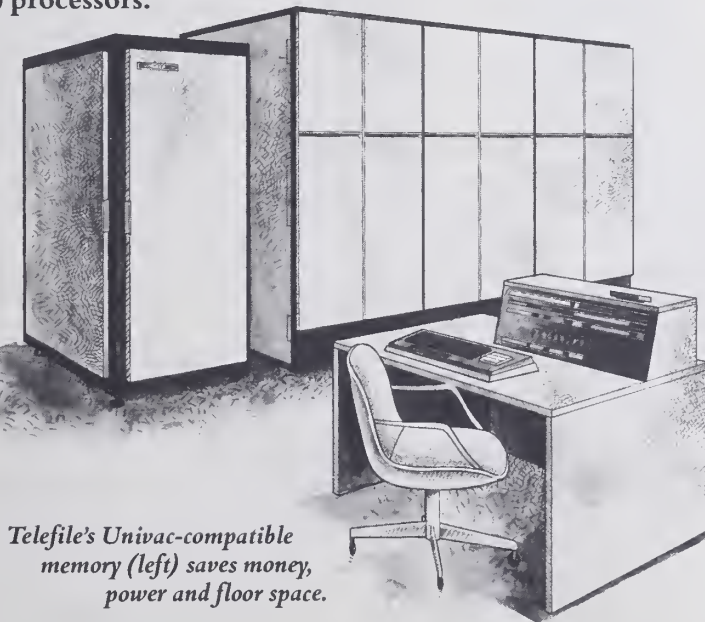
We currently offer unitized memory for 1110, 1100/40 and 1106 processors; and multi-modular memory for Univac 494, 1106, 1108, and 1110 processors.

Both memory types are currently up and running on Univac computers. On one, overall system throughput has been boosted by a remarkable 30 percent!

But this is just the start. Coming down the line are a solid state drum replacement and disk systems that leapfrog 3330 technology. Not to mention some other exciting developments we'd rather not mention right now.

We don't expect Univac to run an ad for Telefile, but someday the users might.

Write: Telefile Computer Products, Inc.,  
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Telefile's Univac-compatible memory (left) saves money, power and floor space.

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# Programmerless DBMS Aids Manufacturer

By C. Thomas Driscoll

Special to CW

MONTREAL — Spar Technology, Ltd. can be characterized as a sophisticated, high-technology manufacturing environment with very strict requirements. Spar Technology has two business groups each with its own plant. One, Communications Systems, manufactures earth station and microwave communications equipment, while the other, the Aerospace and Government Systems group, manufactures spacecraft (satellite) antennae and transponders.

Until recent years, Spar has fixed product lines and very little change in product definition. At that time we were using a standard preprogrammed batch DP system which was designed for our classic product line environment.

Then Spar's manufacturing process changed to a project environment, in which we were manufacturing only limited quantities of highly specified

projects at a time. This change to a dynamic project environment was characterized by a high quantity of engineering and other change activity.

At the same time, more sophisticated user groups were demanding more of our DP system. Our users now required on-line access to updated information. They wanted a system which would be able to incorporate changes more rapidly and to simultaneously analyze the effects of these modifications on the entire manufacturing cycle.

While the batch DP system had been adequate when Spar manufactured static product lines, the changeover to a project environment left us with a system unsuited to our business.

Primarily, the batch system was not flexible enough for our new needs. It was incapable of responding to more frequent change and it could not be modified quickly. In addition, the information we needed was relatively inaccessible. The system had to be run in

its entirety with a fairly long turnaround cycle. This cost us time, money and convenience.

The batch system lacked some significant subsystems. We now needed capacity planning and materials requirements planning (MRP), which was becoming increasingly important in our project-related business, with tight time scheduling. With these increasing areas of inadequacy and dissatisfaction with our DP system, we knew we had to find an alternative.

We rejected the idea of rewriting our old system because it was too complex. A rewrite would have required expenditure of time and money we could not afford. We considered buying another preprogrammed package but, because of our previous experience, we felt we needed more flexibility than a package could provide.

In addition, we did not see any preprogrammed packages that were oriented toward project manufacturing or that could accommodate our special cost tracking and configuration management requirements.

## Different Approach

Given those conclusions, we knew we needed to move to a higher level of technology, to an entirely different approach. The solution was to utilize a fully integrated data base manufacturing system.

We decided to install a system developed by Mitrol, Inc. of Lexington, Mass., because it offered us the ability to incorporate changes as we learned more about our requirements and how we wanted to handle them. It was a system that could be easily modified and quickly updated. Mitrol also offered a system that could be specified and operational within a short time because there was no need for traditional programming, since Mitrol is a self-contained programmerless system.

In addition, the system offered direct access to the user groups. It could provide our users with on-line access to updated information under their direct control. Perhaps most importantly, Mitrol's system could easily be modified directly by the user groups, without requiring DP expertise.

In designing the new system, our user groups talked directly with the Mitrol people to define their requirements on the system. Basically, the users designed the system they needed. It was particularly useful to have the users participate in the design stage because they not only got the system they needed, but they became much more aware of the importance of their role in the efficient functioning of the entire system.

The conversion period was very short. Since more of our data was already computerized, we went from computer to computer, which was quite convenient. It took less than five months, from the time we chose the Mitrol system, to have it fully operational.

Our current application of the system incorporates 18 data sets with over 300 separate updating and reporting transactions that we defined. Our application includes bill of materials maintenance, purchasing and receiving, production planning and scheduling through MRP, labor reporting, work in process control and cost reporting and control.

We actually developed a total management information system for these two manufacturing facilities, almost entirely through the interactive Mitrol request language. Our experience indicates that programmerless systems have truly come of age.

Driscoll is technical systems coordinator with Spar Technology, Ltd., a division of Spar Aerospace Products, Ltd., Montreal.

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Company \_\_\_\_\_  
Address \_\_\_\_\_  
Hardware \_\_\_\_\_

## Don't Forget the End User

(Continued from Page 31)

how much salary expense is in specific departments in each area, how about:  
COUNT EMPLOYEES BY DEPARTMENT ACROSS AREA, or  
TABULATE SALARY ACROSS AREA BY DEPARTMENT

To report on sales activity by month across sales areas (including spacing, report titles and headings), how about:

LIST BY MONTH SKIP 1 ACROSS AREA SUM (SALES)  
TITLE 'MONTHLY SALES'

To prepare a report by product (and in total) for the first six months and compare first and second quarter results, how about:

SUM SALES AND COLUMN TOTAL ACROSS MONTH COMPUTE RATIO = (C4+C5+C6)/(C1+C2+C3)

BY PRODUCT IF MONTH FROM 1 TO 6

Try some of these oversimplified problems on the automated system you are currently using, or compare the conversational response to the manual search time.

## Hope Exists

As you can see from this review, hope exists for the FOE. Some of the available software has been designed to make it easy for him to find what he

wants, compile needed answers and display them as desired. These systems may still be in the minority, but their superiority is so evident that the demand will soon force a new level of excellence in this most important application area.

Bergstrom is executive vice-president of Real Decisions Corp. of Stamford, Conn.

## Pascal Ready For DG Units

PALO ALTO, Calif. — A Pascal compiler for 32K Data General Corp. Nova and Eclipse systems using RDOS is now available from Gama Technology.

Pascal is a high-level language which facilitates structured programming. It was originally designed by Niklaus Wirth of ETH in Zurich, Switzerland.

Gama's compiler, developed at the University of Lancaster in England, implements the P4 standard of the language.

The program binary code is distributed on 9-track 800 bit/in. magnetic tape in RDOS dump format and it costs \$70, he said from 800 Welch Road, Palo Alto, Calif. 94304.

# SYSTEM 50. \$5250

The Video Processing Station that saves you a bundle.

Whoever thought \$5250 would buy a complete data system?



Well, think about this. \$5250 buys you an intelligent video terminal with a built-in microcomputer and a vast array of software. Such as an advanced diskette operating system (ADOS) with extensive file management, an Assembler,

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# A multiple choice quiz on Keybatch.

## A multifunction data entry system from Data 100.

(WARNING: there may be more than one right answer to each question)

### 1. Keybatch is:

- (a) a multifunction intelligent key-to-disk data entry system.
- (b) a brand new multifunction system from Data 100.
- (c) a multifunction system which supports high volume concurrent batch capabilities.

### 2. Keybatch is also:

- (a) a multifunction system offering stand-alone RPG for expanded user flexibility.
- (b) a multifunction system that can operate with on-line file inquiry capabilities (3271 compatible) via common keystations for both data entry and on-line file inquiry.
- (c) a system capable of handling mail sorting and other office tasks.

### 3. As a data entry system:

- (a) Keybatch has up to 20 megabyte disk storage capacity.
- (b) Keybatch is proven with approximately 900 units now in use.
- (c) Keybatch can be configured with 2 to 16 keystations.

### 4. For the end user:

- (a) Keybatch meets short range goals such as appreciable dollar savings.
- (b) Keybatch provides for long range system growth.
- (c) Keybatch offers both of the above.

### 5. For more information on Keybatch, you should:

- (a) search frantically through your EDP literature files.
- (b) write Data 100 at 6110 Blue Circle Drive, Minnetonka, MN 55343.
- (c) call your nearest Data 100 sales office or one of the numbers we've listed.



## Are you a multifunction expert? Check these correct answers.

All answers but four are correct.

1b: Keybatch isn't brand new, was introduced in 1974.

2c: Sorry, Keybatch can't do everything.

3b: There are actually 1500 Keybatch systems on the job worldwide.

5a: No need to search when we're so easy to write or phone. Do it now.

## DATA 100

C O R P O R A T I O N

multifunction data processing

# Charges Harm to Private Lines Adapso Asks FCC to Put Curbs on IRCs

By Ronald A. Frank  
CW Staff

WASHINGTON, D.C. — International data base services being introduced by international record carriers (IRC)s are "an unlawful means to curtail and/or eliminate the availability of private line service," according to a document recently filed with the Federal Communications Commission (FCC).

The charge was made in a petition by the Association of Data Processing Service Organizations, Inc. (Adapso) to deny international service applications made by ITT World Communications, Inc., RCA Global Communications, Inc. and Western Union International, Inc. (WUI).

According to the Adapso filing, the ITT, RCA and WUI services are identical in that they are designed to provide users with a half-duplex, 2,400 bit/sec service between host CPUs, or data terminals using packet-switching techniques.

The proposed services will provide links between the U.S. and Hong Kong "specifically engineered for the transmittal

of data from computer to computer or from terminal to terminal," Adapso told the FCC.

Subscribers in the U.S. will be able to access the services through the Tymnet, Inc. or Telenet Communications Corp. networks; in Hong Kong, access will be by private lines and the operating center of Cable and Wireless Ltd.

The proposed links to Hong Kong represent "an attempt by the IRCs and their foreign correspondent Cable and Wireless Ltd. to eliminate private-line service in the Pacific Basin," Adapso said.

## Letter Cited

The petition referred to a letter sent by Cable and Wireless to General Electric Co. which said "we would not be prepared to provide General Electric Information Services with a private leased circuit from Hong Kong to either Singapore or the United States."

The letter called attention to the data base services being planned by the IRCs and said, "It is our hope and desire that this service will satisfy your needs and the needs of

others like yourselves."

Adapso told the FCC the services being proposed by the IRCs "involve the absolute elimination of basic private line service ..." Such a move would be a violation of the commission regulations and specifically Section 214 of the Communications Act of 1934, which states that private line service "cannot be curtailed without appropriate authorization from the commission," Adapso said.

If the carriers plan to eliminate private line service offerings, detailed information would have to be provided to justify such a move; a statement would also have to be provided showing the public convenience and necessity would not be adversely affected by such discontinuance of service, the petition said.

If GE is required to use the data base services to serve its time-sharing customers, additional and needless costs will be incurred because GE will have to acquire interface equipment to accommodate the non-standard features of the proposed services, Adapso said.

The petition also referred to a recent recommendation to Consultative Committee on International Telephone and Telegraph (CCITT) by the Italian postal, telephone and telegraph (PTT) authority which recommended that "in order to safeguard revenue ... point-to-point based circuit service [private lines] should be disciplined with rates based on volume of data transmitted or

(Continued on Page 36)

# Emulation System Withdraws Bank's Compatibility Problem

MEMPHIS, Tenn. — Banking was one of the first major businesses to utilize data communications on a large scale. However, the proliferation of computer equipment from a wide variety of vendors in the mid-1970s often created compatibility problems.

The Union Planters National Bank here believes it has solved that problem with a data entry and communications system that emulates 18 other devices.

The System 2405-2 from Mohawk Data Sciences Corp. (MDS), which is used exclusively as a remote job entry terminal, "has allowed us to consolidate several different data communication functions in one reliable 'black box.' As a result, we have been able to increase our capabilities in response to new demands without increasing our costs," according to Al Bacon, Union Planters vice-president.

The System 2405-2 utilizes an IBM 2968 protocol emulator which allows an on-line communications link with twin IBM 360/65 mainframes via modem simulators. Both

systems are located at Union Planters' central Memphis facility.

The MDS System 2405-2 fulfills four major functions which might otherwise have required four separate communications systems. The MDS system, which features protocol emulators for 18 different devices, links Union Planters with the St. Louis-based Master Charge network; allows the bank to tie indirectly into the Visa charge card network through an issuing bank in Georgia; and performs data communications with a Michigan service bureau relevant to "lock-box" operations.

The System 2405-2 also features selectable transmission rates which allows Union Planters to transmit data at 1,200-, 4,800- or 9,600 bit/sec — whatever is required by the devices on the other end of the communications link.

Bacon estimated monthly net savings of \$700 to \$750 as a direct result of implementation of the System 2405-2 last January.

(Continued on Page 36)

## Coupler Designed For Teletype 43

SKOKIE, Ill. — Comdata Corp. is offering an acoustic coupler designed to operate with the recently released Teletype Model 43 terminal.

The 150A2-14C, an addition to Comdata's 150 series of couplers and modems, operates at 110- or 300 bit/sec in either half- or full-duplex mode. It weighs 24 oz and draws its power directly from the 43, Comdata said.

The coupler is available for \$147 from the firm at 8115 Monticello Ave., Skokie, Ill. 60076.

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Data rates: Mixture of asynchronous channels up to 300 baud  
Channels: Maximum of 18 channels  
Diagnostics: Remote and local loopback, test, busy-out, indicators  
Multi-drop: Drop one or more channels at a number of locations  
Multiple access: Multi-drop channels have equal opportunity for processor channel  
Line: Dial or dedicated  
Options: Voice-plus-data, data regeneration



\$465 basic unit  
\$325 channel end

## codex

☐ Series 900 time division multiplexer

Data rates: Mixture of synchronous or asynchronous up to the high speed modem aggregate  
Channels: Up to 64 channels  
Diagnostics: Remote and local loopback, busy-out  
Line conditioning: C2 conditioning recommended  
Options: Auto speed detection, multi-drop



\$1283 base unit  
\$152 async channel end

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~multiplexers~

# Emulator Helps Bank Cut Compatibility Snags

(Continued from Page 35)

That figure is based on the actual cost of two devices the System 2405-2 replaced and the projected cost of two new devices that would have been required to handle new applications.

According to Bacon, Union Planters considered several vendors when it decided to streamline its RJE functions. "The MDS price was comparable or lower than the other vendors we looked at," he said. "However, what really convinced us to go with the System 2405-2 was the fact that MDS would commit to performing the whole job in a timely fashion. All four applications were up and running in less than 30 days."

The MDS System 2405-2 replaced two RJE units, a Sycor 340 and an MDS 6403 data recorder, for \$49/month less than the combined cost of the two units.

Utilizing two different protocol emulators, the System 2405-2 allows Union Planters to tie into a fixed-format Sycor-based Master Charge network and to transmit lock-box data to an MDS 6403 in Michigan. In lock-box operations, organizations such as insurance companies and utilities contract with banks in local areas to receive, preprocess and forward remittances to the company or to the service

bureaus which handle their central data processing.

According to Bacon, "Providing lock-box services and transaction processing services related to national credit card systems are increasingly an important and highly competitive part of the banking industry."

The System 2405-2 also allows Union Planters to transmit Visa documents to an MDS System 2409 at an issuing bank in Columbus, Ga.

A fourth System 2405-2 application allowed Union Planters to remove an 800 bit/in. tape drive from its 360/65s. The mainframe configuration originally included nine 1,600 bit/in. tape drives and one dual-density 800- and 1,600 bit/in. drive. The bank has now upgraded to 6,250- and 1,600 bit/in.

drives.

However, certain applications require the 800 bit/in. capability. For example, Union Planters does accounts reconciliation for a number of commercial customers who have their own computer systems.

## Tapes Provided

In addition to issuing printed statements on checking account activity, Union Planters provides tapes with different densities which can be run on the customers' equipment. In order to provide that service in a more cost-effective way, Union Planters' DP staff created a communications program that allows transfer of the account reconciliation data from the 360/65 6,250 bit/in. tapes to 800 bit/

in. tapes on the MDS system and vice versa.

In November, Union Planters will add an additional communications link — via the MDS System 2405-2 — between the 360/65s and an NCR 615 mainframe at another bank 75 miles away. This link is in support of another on-line automated teller machine. In this case, the MDS System 2405-2 will be used to solve a compatibility problem for both banks.

"The NCR link was an unanticipated benefit of the MDS System 2405-2. Because we already had the RJE system in place, what could have been a communications problem was simply another communications application," Bacon said.

## Adapso Asks Curbs on IRCs

(Continued from Page 35)

elapsed time of transmission.

In a similar petition filed with the FCC, the Computer and Business Equipment Manufacturers Association (Cbema) said "there is now a real and present danger of not merely [flat-rate private line] impairment, but absolute curtailment of the tariffed offering."

Flat-rate and volume-sensitive services should be allowed as "co-existing alternatives" for providing data transmission services between the U.S. and Hong Kong, Cbema said.

"The facts clearly suggest a passive acceptance by the IRCs of [Cable & Wireless] intent to replace one service with another" and it would be hard to believe the refusal to provide service was made without the knowledge of the IRCs, Cbema said.

A U.S. government source said there is serious concern about the perceived attempt to eliminate private line flat rate international service. A letter to this effect reportedly has been sent to the U.S. State Department urging that policy be established supporting private line facilities.



Until now, remote order entry meant expensive on-line operation with a computer via a telephone line.

But TI has changed all that.

The new *Silent 700\** Model 765 Portable Memory Terminal has built-in bubble memory. So it can remember, even when the power is off, while it waits to

talk to your computer.

With the 765 you can enter sales and order information all day long using the typewriter-like keyboard.

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The 765's powerful, yet easy-to-use text-editing functions let you add, delete, locate, and correct data on the spot. So you can transmit more accurate data when the phone rates are lower. At a fast 30 characters per second.

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Lightweight portability is the key to convenient field use. And at 17 pounds, the 765 is really compact.

But it's no lightweight when it



comes to features. With its built-in numeric cluster, keyboard with upper and lower case characters, quiet 30-cps printer, and

acoustic coupler for telephone connection, the 765 is a heavy-duty operator.

And the 765 gives you plenty of storage space. The basic terminal comes with 20K bytes of memory. And it can be expanded to 80K bytes—the equivalent of up to 20 fully typed pages.

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## Distributed Processing System

# IBM 3270 Compatibility Feature of Harris 1670

DALLAS — A distributed processing system that includes an IBM 3270-compatible CRT terminal has been introduced by Harris Corp.

The Harris 1670 is an addition to the company's Series 1600 family of remote batch terminals and distributed processing systems. It is reportedly aimed directly at users requiring both remote job entry (RJE) and clustered 3270-type interaction with a host data base while performing a mix of local functions ranging from interactive data entry to batch Cobol applications.

The switchable terminals are said to give the 1670 processor the ability to handle local and remote and batch and interactive applications equally well at

the same time. Their compatibility with 3270-type systems offers users operational and economic advantages, and applications already running on a host IBM 360 or 370 do not have to be reprogrammed, a spokesman claimed.

Typical applications for the 1670 will include remote and local interaction, source document entry and data manipulation, he added. The 1670 can help users logically distribute portions of their data bases and their data processing, he said, while providing a "switched terminal" that facilitates communications with host computers.

For users who already have both clustered 3270-type and RJE terminals at the same location, the 3270-type ter-

minals can be replaced by the 1670 using existing plugs and cabling, without interrupting host function or programming, Harris said.

Hardware and software for the 1670 are compatible with all other members of Harris' 1600 family of remote batch terminals and distributed processing systems, the spokesman noted.

Primary 1670 hardware includes up to 96K bytes of 750 nsec main memory, up to 96M bytes of disk storage and an ability to use as many as 28 CRT terminals in a single system. Standard Series 1600 peripherals include card readers and punches; line, matrix and typewriter printers; magnetic tape drives; cartridge and flexible

disk storage; and incremental plotters.

In a 1670 system, up to eight terminals can be 3270-compatible devices that are switchable for local and remote interaction between a 1670 and a host 360/370 computer; eight can be 3270-like terminals for dedicated communications with a host computer; and the remainder can be Harris 1675 CRT/keystations that are connected locally or remotely to the 1670, the spokesman said.

Interactive 1670 control of 3270-type terminals is completely transparent via a programmable microprocessor having a 16K-byte control memory and 8K- or 16K bytes of buffer memory, he added. The 1675 terminals are under control of the 1670 operating system.

Operational RJE emulation packages support remote communications with a variety of IBM, Univac, Honeywell, Control Data, Burroughs and Amdahl mainframes, according to the spokesman. Self-diagnostics provide local hardware testing to the circuit level.

A typical Harris 1670 including 82,304 bytes of main memory, four switchable terminals, four non-switchable terminals, a 6M-byte disk drive, one 800 bit/in. magnetic tape drive, a 300 line/min printer and 9,600 bit/sec communications will lease for about \$2,658/mo on a three-year lease, including maintenance, and sell for about \$109,616.

First deliveries are scheduled for February from Harris at Box 44076, 11262 Indian Trail, Dallas, Texas 75234.

## Techtran Introduces Hand-Held Recorder

ROCHESTER, N.Y. — The Porta 200 hand-held data recorder is the latest addition to Techtran Industries, Inc.'s family of digital cassette units.

Designed for any application requiring large-capacity, portable data entry, the 3-lb battery-powered unit can be used to input and store data for warehousing, inventory control, field site data acquisition and retailing, the firm said.

As the operator enters data on the 16-key pad, it is displayed for verification and recorded on an 85,000 character digital cassette.

The cassette can be read on any Techtran RS-232 plug-compatible Datacassette for transmission to both local and remote terminals and CPUs, according to the company.

The Porta 200 is priced at \$825 including battery and charger. Techtran is at 200 Commerce Drive, Rochester, N.Y. 14623.

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TI's new Model 765 Portable Memory Terminal is priced at only \$2,995.† Additional 20K increments of bubble memory are \$500† each.



And, the table-top Model 763 at \$2,695† is another price/performance leader. Of course, quantity discounts and a complete range of lease programs are available.

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Our exclusive Dual-Port Feature (dynamic device switching), which

increases subsystem availability by up to 87.5%, is a marked improvement over IBM's string switching. And ITEL's patented Advanced Function Capability increases the effectiveness of dynamic device switching and provides a potential system throughput improvement over IBM's Write Format Release. These standard features, plus the fastest access time currently available, allow an increase in throughput of up to 25%. In addition, the microprocessor also provides substantial diagnostic capability which further enhances the 7350's performance. And as always, ITEL

offers superior performance and 100% compatibility at a significantly lower cost.

When it comes to price/performance, ITEL has always been a sensible alternative to IBM. Now, when it comes to reliability, availability and serviceability, the 7350, with its built-in computer, makes ITEL the only alternative.

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# Cluster System Handles Dispersed Data

CORNWELLS HEIGHTS, Pa. — A cluster system that reportedly suits small business applications requiring immediate access to local data bases has been introduced by Delta Data Systems Corp.

The Delta 6500 system holds up to 1.5 million characters of storage and allows up to eight Delta 4000 display terminals to share a processor, host communications port and two printers, the company said.

Systems modules include a 64K-byte processor, IBM 3780-compatible bi-synchronous communications interface, printer and floppy disk interface.

Delta 6500's three-level software package incorporates an operating system, file management system and program development system, a Delta Data spokesman said.

The operating system controls the operation and interaction of all system

modules and offers functions like system IPL, applications software loading and loading/execution of various debug routines, the company explained.

The file management system allows

## Terminal Transactions

operators or applications programs to create, retrieve and edit information stored on diskette files, the firm added.

The program development system comes with 48K bytes of additional memory for custom-written Fortran programs and expands the system's repertoire of specialized applications or information retrieval schemes, the

spokesman said.

Combined with the company's Delta 4300E text-processing CRT terminals, the system suits text-editing and word-processing applications of all kinds, Delta Data said. Other applications include data or order entry, financial information management and small business transactions, the firm added.

The Delta 6500's peripherals interface processor accommodates up to 12 RS-232-compatible hardware devices operating at up to 9,600 bit/sec, Delta Data said. The system's floppy disk unit incorporates up to six drives, each storing up to 242,900 characters of IBM 3740-compatible data.

A basic Delta 6500 system costs \$5,950. Delta Data is at Woodhaven Industrial Park, Cornwells Heights, Pa. 19020.

## Terminet Put On TWX Net

CAMDEN, N.J. — The DE-100 TWX/DDD data set available from RCA Service Co. is said to allow utilization of the high-speed GE Terminet 30 teleprinter on the TWX network as well as in Bell Dataphone applications.

The unit automatically senses and adjusts printer speed to the incoming call (30 char./sec for Dataphone, 10 char./sec for TWX) and meets Federal Communications Commission certification rules.

On a one-year lease basis, the TWX/DDD terminal including the DE-100 data set costs \$171/mo from the RCA Service Co., Cherry Hill Offices, Camden, N.J. 08101.

## DTS Scanner Eliminates CPU In Back Room

MAYNARD, Mass. — Data Terminal Systems, Inc. (DTS) has unveiled its Model 540 Scan-A-Lone, a free-standing supermarket scanning system.

The Model 540 system offers full Universal Price Code (UPC) slot- and wand-scanning capability without requiring "a complex and expensive back-room computer," according to the company.

DTS estimated a typical Model 540 installation will be approximately 60% of the price of back-room computer-based scanning systems that cost \$12,000 to \$15,000 per checkout lane, plus installation, maintenance and other costs.

The Model 540 terminal includes a 20-char. display and 23-column dot matrix printer, both of which have full alphanumeric description of items purchased to enhance consumer acceptance of UPC price marking.

With an expanded memory file, the Scan-A-Lone has access to price lookup or stock keeping unit (SKU) code records in selectable amounts up to 15,000, replacing manual entries with scanner input, DTS said.

With the DTS modular design, the Model 300 and 440 electronic cash registers already in the field can be upgraded to Model 540 capabilities, the firm said.

DTS is headquartered in Maynard, Mass. 01754.

## WUI Enhances Telex

NEW YORK — International Telex users can now select up to eight overseas numbers at one time with Multi-Call, an option from Western Union International, Inc. (WUI).

To use Multi-Call, a subscriber accesses WUI's international Telex network and enters up to eight overseas selections using the Multi-Call format. WUI then tries each overseas number. When all possible connections have been completed, WUI automatically retries unsuccessful numbers. Multi-Call is available to Telex users at no additional charge. Information on the option is available from local WUI offices.

## SARA does wonders for your system.



SARA (Systems Analysis and Resource Accounting) is good medicine for anybody's system. It's the most comprehensive, versatile and cost effective computer performance and accounting system ever developed. Now SARA is being offered by BCS on a 30-day trial basis for a nominal charge. This is an excellent opportunity to diagnose your entire configuration. Mail the coupon today, or for faster action, call (703) 821-6275 or (800) 336-0135 (toll free).

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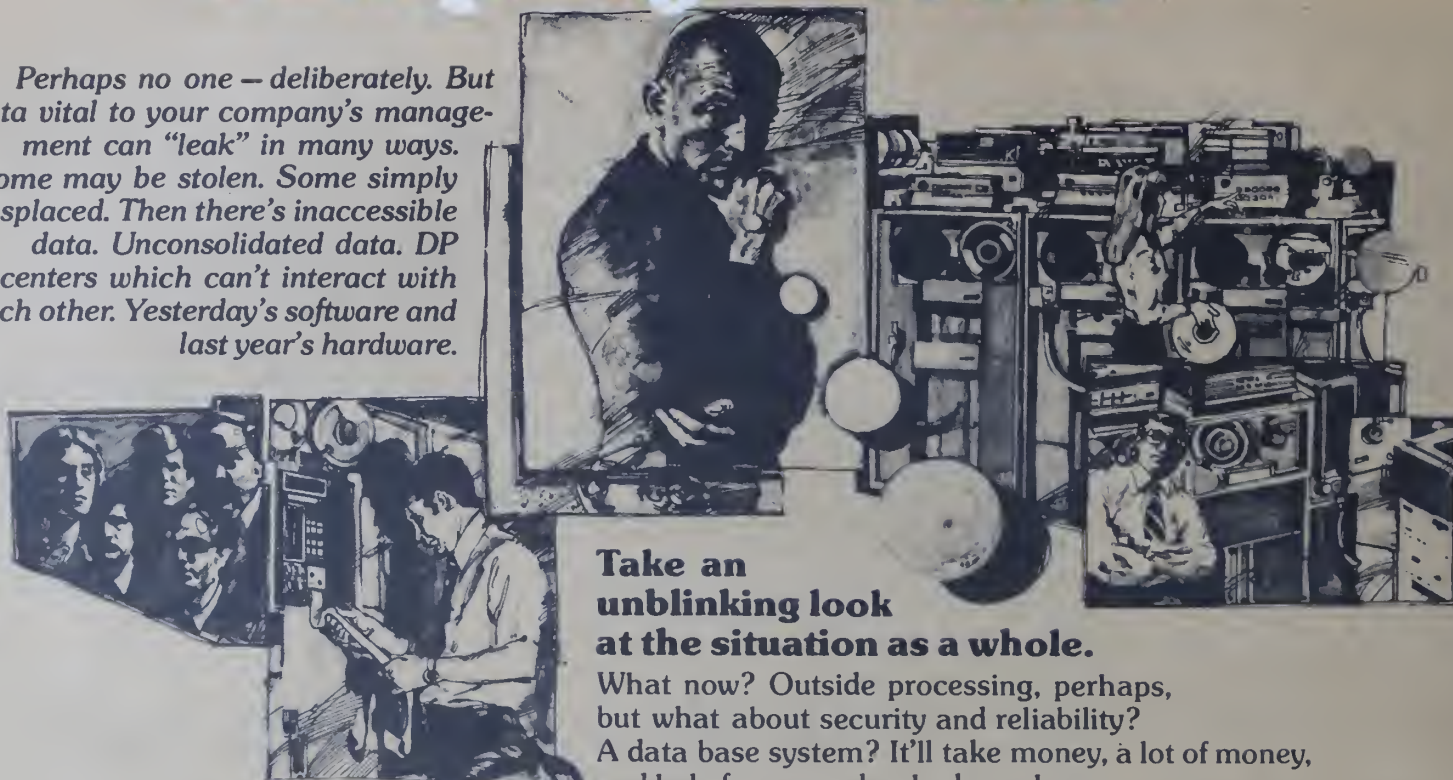
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# Who's leaking company secrets?

Perhaps no one — deliberately. But data vital to your company's management can "leak" in many ways. Some may be stolen. Some simply misplaced. Then there's inaccessible data. Unconsolidated data. DP centers which can't interact with each other. Yesterday's software and last year's hardware.



## Take an unblinking look at the situation as a whole.

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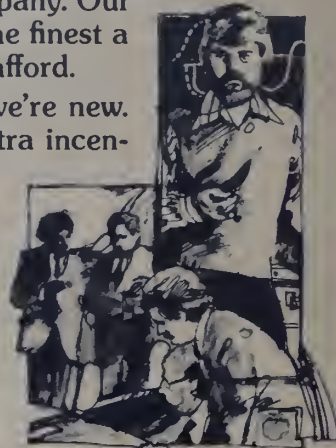
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# City Saves \$13,000/Mo with IBM 3800

Special to CW

NEW YORK — The nation's largest social welfare agency is using an IBM 3800 high-speed printer to produce negotiable documents — over one million documents in just 35 hours during a recent test. The Human Resources Administration's use of this printing method, believed to be the first such application in the U.S., is helping this financially plagued city save \$13,000 per month in printing authorizations for the purchase of food stamps.

Last June, in a capability test, the city agency printed one million food stamp authorizations in 35 hours for 500,000 recipients, meeting the July 1 deadline of a new federal regulation requiring that two food stamp authorizations be sent out once a month instead of one being mailed twice each month.

"At that time, we were faced with a requirement to print food stamp authoriza-

tions which was far beyond the capacity of our installed printers," according to Frank Farnsworth, deputy director of the DP office. "We needed equipment that could print much faster."

However, the agency's decision to change to the IBM printer was not dictated only by the federal rule regarding the food stamp authorizations. For two months the DP office had conducted a study of its printing workload and the types of printers that could help cut operating costs, Farnsworth noted.

"We were thinking in terms of cost benefits as well as increased printing capabilities," he recalled.

If the agency had not chosen the 3800 printer, its alternative would have been to print the negotiable food stamp authorizations on three other printers and hire more people.

"It would have tied up more printers and limited our control of the negotiable documents. We needed to control the continuity of the numbering sequence," Joe Rocco, DP director, pointed out.

Next January, the city agency will install another 3800, retaining one older printer. This final configuration will replace the six conventional printers formerly used by the agency.

Reducing the number of printers from six to three will enable the DP office to greatly increase the quantity of work at a reduced cost, but with no increase in the size of staff, Rocco said.

The food stamp authorization form had to be redesigned to accommodate the optical character reading requirements of banks, where the authorization slips are presented to buy food stamps, as well as the new federal regulation and postal requirements.

Although the new design requires the printing of eight lines compared with the previous four lines, the 3800's printing speed has remained constant; under the previous method, an increase in the number of lines would have increased printing time. Incorporating the latest lineage requirement would therefore have required 140 hours compared with the present 35 hours.

The agency can now print one million food stamps in two days, once a month, saving \$156,000 a year on the printing of food stamp authorizations alone.

An added benefit to the city has come with a change in the procurement of preprinted forms. Instead of purchasing all of these forms, the city agency now prints 50 of them on the 3800.

Also, paper costs have been reduced by the elimination of multiple-part paper and DP printouts can be reduced and printed on smaller size paper (8.5- by 12 in.).

"The reduced printouts of the hard copy are clearer and easier to read when done by the 3800," Farnsworth commented. "We definitely save money by doing printouts on smaller sheets."

An example of these savings is the monthly printing of the food stamp rolls. Originally, this involved 28 boxes of standard six-part paper.

In August, the IBM 3800 was used to run six copies of each report — all originals. The printing took the same amount of time as it did with the old six-part form printer.

All copies, since they are originals, have equal legibility, Farnsworth said, and costs were reduced and decollating eliminated.

Installing a second 3800 in January will give the agency a 22,000 line/min capability, compared with its previous 14,000 line/min capability using six printers.

## Bits & Pieces

### Executives Offered Assertiveness Training

NEW YORK — A course designed to teach the executive to respond to any situation according to personal desires, feelings and interests is being offered by American Management Associations (AMA).

The "Assertiveness for Career and Personal Success" program is an audiocassette/workbook course that presents a series of exercises, self-evaluations and personal inventories as well as self-awareness sessions to develop a person's potential, according to a spokesman.

The course is available to AMA members for \$90 and to nonmembers for \$100. AMA is at 135 W. 50th St., New York, N.Y. 10020.

### Fiche Unit Makes Enlargements

STAMFORD, Conn. — Xerox Corp. has introduced a microfiche reader/printer that it said can produce enlargements from multiple film formats and handle a broad range of microfiche from 24X to 48X reduction.

The Xerox 710 is reportedly capable of producing four 8.5- by 11-in. enlargement/min from a 4- by 6-in. microfiche card containing up to 270 frames of information.

The 740 sells for \$3,700 and can be leased for a minimum of \$120/mo from Xerox in Stamford, Conn. 06904.

## Water Leakage Detector Sensitive to 1/64 of Inch

GREENFIELD, Wis. — A water detection alarm that can reportedly provide an early indication of liquid leakage in computer installations has been introduced by Dorlen Products.

Water Alert provides an alarm in the form of a loud, high-pitched "on-off" sound for up to 24 hours, a flashing light or a telephone call through an automatic dialer, according to a spokesman.

Detection takes place very early, since only a thin film of liquid on the surface monitored by the device will activate the built-in alarm, he added.

The unit "is roughly the shape of a frisbee," the spokesman said. Its diameter

measures 6 in. and it weighs approximately 10 oz.

Water Alert is self-contained and operates on a battery with a one-year life span. The sensor on the device can be adjusted to activate the alarm with a water film between 1/64- and 1/8 in., the firm claimed.

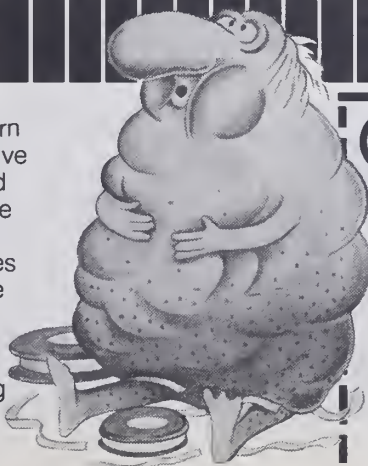
The detector is priced from \$30 to \$80 depending on options such as an automatic phone dialer or a remote indicator.

Dorlen Products, a division of Electro-Consultants, Inc., is located at 7424 W. Layton Ave., Greenfield, Wis. 53220.

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## After Meeting Own Needs

# Insurer Enters COM Service Business as Extra

Special to CW

SHORT HILLS, N.J. — When the Chubb Corp. began producing computer output microfilm (COM) for its operations in 1970, its lone application was a loss dictionary of less than 500,000 frames annually. Now the insurance holding company produces more than 42 million frames annually — and it has entered the COM service bureau business.

"The loss dictionary lists every company loss within a given period," David Burnett, a systems analyst, explained. "The report is an important underwriting tool, one we like to check before renewal notices go out. But until 1970, the loss dictionary took so long to print that we were able to issue it only quarterly."

"Mailing the 200 boxes of printout consumed by the report was also costly," he said, adding those costs were trimmed with the switch to COM.

"With an Eastman Kodak Co. KOM-80 microfilmer, we found that we could produce the loss dictionary in a fraction of the time on a more useful monthly basis and mail microfiche copies instead of bulky computer printout," Burnett said.

Since that first project, Chubb's DP and COM departments have grown dramatically. Chubb/COM Services was formed to serve Chubb's own needs as well as outside customers such as banks, industrial accounts and publishing houses.

"This lets us get maximum use from our 150 programmers and a massive bank of computer power," Burnett noted. "By acting as a service bureau for other businesses, we can profit from adapting software and capabilities we've developed for our own use."

In addition to offering DP services, a Chubb computer service sells and maintains software packages for other computer systems. A Chubb school teaches future programmers and systems analysts. And Chubb/COM Services offers users the chance to convert information on their computer tapes to microfilm.

Some clients are insurance companies with applications similar to Chubb. Chubb's principal insurance operations are property/casualty, but also include life and health insurance.

"All of our COM applications involve microfiche," Burnett said. "We issue our loss master print and many other reports on microfiche. This helps us process claims faster, issue corrections and keep track of our losses more efficiently."

For other Chubb customers, especially retailers, computer information is often converted to 16mm microfilm and encoded for automated

retrieval.

"Our customers can feed accounts payable documents, checks, statements and personnel records into the

the firm is coded for automatic retrieval, it can be searched quickly and the desired information usually can be found in seconds.

*The Chubb Corp. is profiting two ways from its COM capabilities — through efficient records management and by selling its services to outside companies. Its total COM output has grown from half a million frames per year seven years ago to 3.5 million images a month today.*

computer for immediate use and have the information microfilmed for storage," Burnett pointed out. "Since

"For example," he said, "several pharmaceutical companies use Kodak Miracode II retrieval terminals for

locating invoices. As invoices are paid, they are grouped by the computer and transferred to 16mm encoded film when they are no longer current."

The manufacturer then can find the invoice at a later date, even if all the information is not available. The date issued, date paid or customer number can be used for lookup. The retrieval terminal will search the film automatically, stopping first at the most recent documents.

When random access is not needed, the edge of the film is "blipped" by the microfilmer with marks which make it possible for retrieval terminals to count the images. When the specific

(Continued on Page 50)



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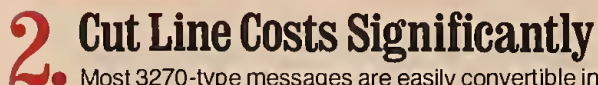
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## Problem-Solver Solves Own Problem

# Inforex 5000 Keeps Client Data Base Current

Special to CW  
WORCESTER, Mass. — Wright line, Inc., a firm that has devoted itself to solving computer-related filing problems, has turned to an Inforex, Inc. System 5000 file management system to help solve its own business development problems.

Wright Line designs, manufactures and distributes specialized filing systems for DP media. Its business development efforts are centered around its catalog ordering programs, with direct mail to over 85,000 customers and prospects.

In order to avoid duplicate mailings, which are quite costly, Wright Line must be able to maintain complete and

up-to-date files on its customers and prospects.

The company first tried to maintain its data base in two other ways with an outside service bureau and with an in-house keypunch system. The service bureau posed many problems for the firm, according to Charles Olmstead, VP of administration.

"We had no way of controlling our critical data. The outside bureau maintained the data base and we never knew, for example, whether vital customer and prospect information changes were ever received or entered into the files," Olmstead said.

"What was worse," he added, "our catalog mailing program was riddled

with duplicate mailings, costing the company thousands of dollars a year."

### Keypunch Cumbersome

After using the service bureau for a year, the company then maintained its data base with an in-house keypunch system, which was slow and cumbersome, according to Olmstead.

"There was no breakdown of detail in our data, up-to-the-minute validation was impossible and there was no way for us to instantly access the data base. We tended to focus our sales efforts on large computer sites simply because our keypunch system couldn't handle additional volume data input on smaller computer users," he said.

Not only did Wright Line want to reduce duplicate mailings, it also wanted to be able to use the customer/prospect data for a variety of purposes, including identifying high- and low-potential accounts and projecting catalog mailing demand and frequency, as well as maintaining complete mailing, shipping and billing information.

A number of alternatives were considered by the company before selecting the System 5000, including mainframe upgrading and stand-alone minicomputer system.

"This was our first attempt at decentralizing our DP operations. We selected Inforex's System 5000 because of the speed with which it could implement our program," Olmstead said. "Other vendors couldn't even compete with the start-up speed. Our operators were using the system in just a few days after it was installed. In a matter of weeks, we were up and working," he added.

### Data Base Doubled

Since being installed last November, the system has solved many of Wright Line's business development problems, doubling the size of the customer data base, reducing billing errors and reducing duplicate catalog mailings in the process, Olmstead said.

Wright Line's customer data base has increased from 43,000 to over 64,000 names since November, with several hundred customers and prospects being added each week. The company expects to quadruple its data base while using the system.

The disk-based file maintenance system at Wright Line includes two 30 char./sec serial printers, nine CRT terminals, a control unit with 64K bytes of core memory and four 25M-byte disk drives.

In addition to the customer and prospect data base, Wright Line is using the system for a variety of additional applications, including forecasting catalog requirements and advertising program dollars; providing meaningful sales support information regarding prospective accounts, as well as mailing, shipping and billing information; identifying industry/-marketing trends; compiling historical data regarding ordering cycles and company productivity; and determining manpower deployment, quota assignment and industry segmentation.

### Compiling All Sites

The company is also using the System 5000 to develop what it hopes will be the most complete listing of computer sites in the U.S. and Canada. This data base is, to a great degree, a key ingredient in the continuing growth of Wright Line, Wayne Clemens, marketing vice-president explained.

"We've purchased several lists of computer sites, and already we've been able to compile a greater number of computer users than all those lists combined. The more computer users we're able to identify, the more data we can compile and, in the end, the more catalogs we can mail out.

"As a result, we anticipate a projected sales volume increase of 25% as a result

(Continued on Page 50)

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# File Management System Keeps Data Current

(Continued from Page 46)  
of our comprehensive data base approach," Clemens said.

"We've traditionally been forced to focus our sales effort on large main-frame users, but now we're able to pursue the small business computer market as well," according to Beverly Kilinsky, business development manager.

"Up until now," Kilinsky continued, "we've never been able to break down customer information into smaller, more detailed and usable parts of information. Now, instead of being decentralized in our overall program development, we're centralized, and we're in complete control."

"Eliminating outside services and improving our keypunch techniques has

finally given us genuine control. Now we know what catalogs are mailed, when, to whom and whether that contract ever received it."

"In addition, the system has helped us improve our credit and returns, has drastically reduced duplicate catalog mailings, has reduced our billing errors substantially and has lessened the paper work workload of our sales force, providing us with up-to-the-minute data when we need it," she said.

The company completed an estimated 70% of its catalog deliveries with the outside service bureau, according to Kilinsky. Now over 90% of its combined main catalog and direct order catalogs are delivered. The reduction of duplicate mailings has saved

Wright Line \$20,000 to 30,000 annually, she said.

Prior to installing System 5000, the company could only maintain one contact per customer account on the data base. Now up to eight contacts per account can be maintained.

## Long-Range Goal

The company's long-range goal, Kilinsky said, is to determine who the buying influence is at each customer and computer site. "The amount of business we do is directly proportionate to the number of people who get their hands on our catalogs. So we want to be sure the right people get them," she said.

The company maintains basic customer data on its IBM 370/125 main-

frame, which is used periodically for accounting purposes. All customer data transferred to the host is merely a subset, however, of the Inforex data base.

"Everything is added or subtracted from the 5000 data base," Kilinsky explained. "That's where the real detail is for our customers and prospects."

"We expect a return-on-investment in less than two years," Olmstead added. The 5000 "drastically reduces the time ordinarily spent in many of the usual development steps, such as systems planning, design, functional specifications and testing."

"It allowed us to plan, design, install, convert from batch and go 'live' with our applications in just weeks, rather than months or years."

"We've already received very quantifiable benefits from its use, and we expect to see continued benefits as more and more applications are developed," Olmstead concluded.

## ATTN: 3270 Users

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## Insurer Enters COM Business

(Continued from Page 43)

microfilm "address" of a desired document is known, the user can find the item in seconds.

Such retrieval eliminates the need to retain information indefinitely in the mainframe's memory.

Chubb now has three COM microfilmers: the original Kodak KOM-80 microfilmer plus one additional KOM-80 and one KOM-90 microfilmer. The three units give the company flexibility in the amount and types of tapes it can handle, Burnett said.

"The KOM-90 microfilmer is used only for native-mode tapes — tapes already processed for COM," he explained. "With machine commands and other formatting data included, they can be run through the microfilmer at a very high speed."

"Customers with their own computer systems can change their microfilm format without our intervention by changing their native-mode tapes."

The KOM-80 microfilmers handle print-image tapes (raw tapes formatted only for impact printers). These must be run through one of Chubb's minicomputers before they can be used to produce microfilm.

The minis feed directly to the microfilmers, allowing print-image tapes to be run in sequence, although at a slower speed than on the KOM-90 microfilmer. If the customer desires, the tapes also can be run through one of Chubb's large mainframes and then run on the KOM-90 microfilmer in native mode, but this step is seldom necessary.

"It's a valuable capability, though," Burnett said. "If one or more of our COM units were down, we could run all tapes on the remaining microfilmer. That's another advantage we have over smaller computer services that may not have the equipment we have."

Chubb is currently producing more than 3.5 million COM frames a month. About 25% of that output, or 875,000 frames, is for Chubb's use, while the rest is for service bureau customers.

# Mini 'Locks Out' Delinquent Borrowers

By Esther Surden  
CW Staff

PHOENIX — Delinquent borrowers are the bane of libraries, but a minicomputer-based turnkey system is helping the public libraries here "lock out" patrons who have overdue books.

Before the system was installed, the libraries used microfilm checkin/checkout procedures. "Patrons were going from branch to branch, checking out

books" with their activities only loosely monitored, according to Terry Terrell, computer systems analyst in the City of Phoenix's Management Information Systems Department.

Terrell, along with Juanita Robison, library technical services administrator, researched the field to find the right system to fit the city's needs.

The resulting system has allowed the libraries "for the first

time in years" to perform delinquent processing on a current basis. Notices of overdue books previously were mailed out later than they should have been to be effective, Terrell said. The libraries have also saved some manual labor, Robison added, recalling that notices were formerly typed by hand.

Most of the city's 10 libraries are currently on-line; when the remaining ones are brought up, another benefit is expected from the system — a complete book inventory.

Previously, the inventory was incomplete and it was a nearly impossible task to keep track of all the books, Robison said.

## Evaluated Its Options

The city evaluated many options before choosing the turnkey system approach, Terrell said. Among those options were putting additional terminals on the city's Honeywell 6000 system. Terrell and Robison eliminated that choice because the mainframe's processing would have been degraded, he said.

Turnkey library systems were examined next. Terrell and Robison looked at one from 3M, one

from CL Systems, Inc. (CLSI) and one from a Toronto based company called Universal Library Systems.

"We chose Universal's Ullisys system because it used Digital Equipment Corp. hardware with standard operating software and a standard programming language," Terrell said. The others used a unique language and, in the case of the CLSI system, a unique operating system.

In addition, with the Ullisys system, "we could rely on DEC for hardware maintenance," which Terrell said was a big benefit. Universal was also the low bidder.

Based on a PDP-11/70 running under RSTS/E operating software, the system includes 26 terminals that are distributed among the main library and the nine branches for data base creation and circulation control. The DEC VT50 terminals are used in combination with a scanner pen which reads the bar-coded labels placed in the libraries' books and on patron cards.

In preparation for the system, the bar-coded label was attached to each of the more than 1 million  
(Continued on Page 54)

## Mini Bits

### Three-Day Meet Set for Six Cities

NEW YORK — The uses, economics, programming and implementation of minicomputers are the focus of a three-day seminar to be presented in six cities in the U.S. and Canada next year.

Sponsored by the University of Chicago Center for Continuing Education, the seminar will deal with minicomputers as an extension to or replacement of the central processing department. It will analyze the planning and installation of minicomputers on a stand-alone or decentralized basis, according to a spokesman.

Leading the seminar will be George R. Trimble Jr., president of T-Logic, Inc., a consulting firm. It will be held in Atlanta in January, in Los Angeles in February, in New York in March, Chicago in April, Toronto in May and San Francisco in June.

Attendance costs \$435 plus a \$60 registration fee which is applicable to the first person of a company who attends. Additional details are available from the New York Management Center, Department 14NR, 360 Lexington Ave., New York, N.Y. 10017.

### Topaz Adds Regulators

SAN DIEGO — Topaz Electronics has a series of ac line regulators designed to protect minicomputers and related equipment against brownouts and other

voltage fluctuations.

The units feature dynamic regulation and response, operate quietly and are compact for ease of installation and relocation, Topaz claimed. They are offered in power ratings from 600 Va to 1,600 Va.

Prices begin at \$360, the firm said from 3855 Ruffin Road, San Diego, Calif. 92123.

### Supplies by Mail Offered

HOLMDEL, N.J. — Minicomputer users who need supplies in small volumes can get them from Misco, Inc.

The firm offers a product catalog for mail orders and said it will ship supplies to customers within 24 hours. Products include media storage devices, according to a spokesman.

Misco can be reached through Box 399, Holmdel, N.J. 07733.

### PDP-11 Cable Reduced

PALO ALTO, Calif. — Minicomputer Accessories has reduced the price of its Digital Equipment Corp. PDP-11 Unibus cable from \$100 for the first 2-ft length and \$5 for each additional foot to \$100 for the first 2-ft length and \$3.50 for each foot thereafter.

The cable has a bus connector functionally equivalent to the M929 connector on one end and a bus connector equivalent to the M919 on the other end, the company said.

The firm is located at 1015 Corporation Way, Palo Alto, Calif. 94303.

## Reality Still Supported, Upgradable to Royale

IRVINE, Calif. — When Microdata Corp. introduced its Royale system [CW, Oct. 31], the question arose of how the announcement would affect present Reality users.

The answer, according to Microdata President Donald W. Fuller, is that the Reality will continue to be supported. Present users, however, have the option of upgrading to the Royale for \$2,500, which includes the price of the CPU and the additional firmware. Once the CPU is upgraded, the user can choose to increase disk capacity or memory or add other peripherals as they see fit, he said.

The Reality user's present software investment is protected, Fuller claimed. "You don't have to change a line of code" if it was developed with standard Micro-

data software, when moving from the Reality to the Royale, he stated.

Several features of the Royale differentiate it from its predecessor, Fuller noted. For example, memory capacity is double that offered on the Reality, increased disk storage can be accommodated and "major parts of the software are moved into hardware."

Applications languages have been moved into firmware, he said, and the method of performing disk I/O has been totally changed to produce improved transfer rates.

In addition, the system can prioritize functions, he said.

The high end of the Royale family uses Reflex disk drives, a product Microdata introduced in June 1976, Fuller noted.

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# With No Added Labor Costs Newspaper Scoops Savings Via In-House Mini

By Paul J. Zindell

Special to CW

HUDSON, N.Y. — The Hudson Register-Star here, a daily newspaper with a circulation of 13,500 has switched from using a DP service bureau that cost it \$18,000 per year to an in-house minicomputer system costing \$18,000.

Programming for the Digital Equipment Corp. Datasystem 310 cost another \$9,000 for a payback in one and one-half years. No additional labor costs were incurred because each department using the system also provides personnel to input the data. Computer operation and input is eased by the prompting nature

of the applications software.

Installed in May 1977, the system supplied by Vision Data Equipment Corp. consists of a PDP-8/A computer drives with 16K bytes of main memory, a VT52 terminal, two floppy disk drives and a 180-char./sec. printer.

Applications software, written in Dibal under the COS-310 operating system, consists of accounts receivable, accounts payable, circulation receivables, circulation mailing lists, payroll, budget analysis and editorial story analysis. A general ledger program is scheduled to be installed soon.

Accounts receivable programs produce daily sales and

payment journals, daily and monthly space summaries and monthly aged-trial-balance reports by alphabet, salesman, geographic area and type of account.

The system is capable of printing 800 itemized monthly bills in three hours. It also produces delinquent account lists broken down by over-30, over-60 and over-90 days, with telephone numbers to facilitate solicitation. All of these reports and the invoices result from an input time of one hour per day.

## Payables Run Weekly

Accounts payable programs are run weekly and produce a check register and print vendor checks. The payables are also run against the budget to

produce a monthly budget analysis broken down by category within the various newspaper departments. Input time for the payables is approximately two hours per week.

Circulation programs produce a daily cash transaction report, weekly collection reports by route, aged weekly bills for carriers and vendors, weekly ledgers by zone and by town to conform to Audit Bureau of Circulation requirements, weekly aging report and a draw list for the following week.

Daily bundle labels showing the driver, carrier and number of papers are also printed. The carrier programs allow for temporary starts and stops

and individual mailing labels are printed presorted by Zip Code.

## Automatically Billed

Mail subscribers are automatically billed prior to their expiration date and subscriptions are extended accordingly. Circulation input time amounts to less than one hour per day.

All required payroll reports, including W2 and 941 forms, are produced by the payroll programs. Payment is optional by check and/or cash and a weekly cash breakdown is provided. Input time for 75 employees is approximately one-half hour weekly.

The editorial program keeps track of each reporter's daily story count and average count month-to-date and year-to-date. Also provided are totals and averages for the entire department daily, month-to-date and year-to-date. Input time is less than five minutes per day.

Zindell is production manager for the Hudson Register-Star, Hudson, N.Y.

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## Vendor, User Visits Key to Paper's Search

By Esther Surden

CW Staff

HUDSON, N.Y. — When the Hudson Register-Star here decided to bring its DP in-house it conducted a year-long investigation of small business systems, according to Paul J. Zindell, production manager. The investigation included four weeks of visits to installations both at user sites and vendor offices, he noted.

"We were looking for a system that cost less than \$50,000," Zindell explained. At that price, the newspaper would receive a three-year payback on the system when comparing that cost with the projected service bureau costs.

Zindell was knowledgeable about computers before he made the search. "It's always been a hobby of mine and for the two years preceding [the investigation] I went back to school at night" to pick up computer courses.

## Contacted Vendors

With this up-to-date background in programming, Zindell contacted the 14 companies involved in the search.

The salespeople, he found, "would assume you didn't know" much and "practiced outright deception," he charged.

The systems considered included those from Basic/Four Corp., Burroughs Corp., Data General Corp., Digital Equipment Corp., Hewlett-Packard Co., Honeywell Information Systems, IBM, Microdata Corp., NCR Corp., Olivetti Corp. of America, Singer Business Machines, Texas Instruments, Inc. and Wang Laboratories, Inc.

Several of the manufacturers were not visited, he reported.

For example, the HIS Level 6 systems, which were in the right price range, had only recently been announced and HIS did not provide supporting software.

Hewlett-Packard's prices started at \$99,000 "for anything other than a sophisticated calculator." The Olivetti had "no area outlets with demonstration capabilities."

"We eliminated IBM first," Zindell noted. According to the report issued, IBM had a "maintenance charge on software which we feel is exorbitant. In addition (it had) no CRT for inputting data." NCR was also eliminated because of its maintenance charge.

Philips was "more a ledger card system than a computer" and along with Burroughs had no CRT for data input. The Basic/Four and Microdata systems did not have local service or software support, he added.

Wang's policy of separate hardware and software vendors, the production manager said, "opens the policy of dispute over responsibilities after installation."

DG lacked proven applications programs, the report noted. This left Digital Equipment Corp. as the final choice.

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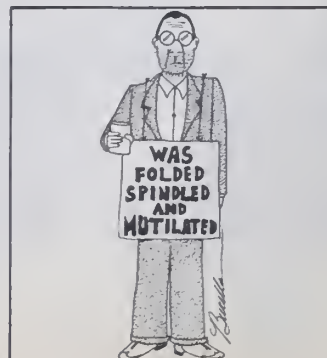
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## Typeset Options Extended

PLAINVIEW, N.Y. — Three modular, on-line micro-computer-based systems designed for commercial, inplant and newspaper type-setting applications are available from Varisystems.

The systems use a distributed approach, with microcomputers of the company's own design distributed throughout the system, a spokesman explained.

The three products include the Varicomposer Multiterminal Systems (MTS) for high-speed information processing and editing, the Varicomposer 1A, a single-CRT system that interfaces up to three floppy disk drives; and the Varicomposer Data Gathering System, designed to input to the Varicomposer 1A or the MTS from simultaneously operating work stations.

The basic MTS, which includes two CRTs, five floppy drives and a multiplexer, costs \$32,120. The Varicomposer 1A costs \$13,340.

The Data Gathering System, which permits input from up to 10 CRTs and interfaces the CRTs to a single processor and two floppy drives, is priced at \$30,470, the company said from 80 Skyline Drive, Plainview, N.Y. 11803.

## Doctors Get Turnkey

PHOENIX — An on-line, real-time turnkey medical management system designed for both doctors and dentists is available from Escom Ari-

zona.

Based on Microdata Reality equipment, the system is structured to accomplish 12 major tasks for the professions.

They are patient and responsible party registration; transaction processing; billing and insurance claim form processing; inquiry; report generation; file maintenance; report printing; security/password control; file backup; microfiche formatting; patient scheduling; and medication control.

A typical system including 32K of core, a 10M-byte disk drive, 800 bit/in. tape, 300 line/min printer, four CRTs and the software costs \$72,405.

That price includes training, documentation, preprinted forms and conversion assistance. Hardware maintenance is furnished by Microdata. Escom Arizona is at Suite 400, Building B, Phoenix, Ariz. 85034.

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## Calma Turnkey Gives Graphics

SUNNYVALE, Calif. — Calma's Graphic Data System II (GDS II) is a turnkey mini-computer-based system developed to provide a solution to the problems of design, documentation and artwork generation, according to a spokesman.

The system features 32-bit integer coordinate precision, data bases that accommodate both graphics and non-graphics information and a command language that can be used by both novice and experienced users.

A GDS II system includes a

Data General Corp. Eclipse S/230 CPU, 12.5M-word removable disk pack, magnetic tape and a system console. Design stations, plotters and as many as six CRTs can be added to the system.

Users who have the advanced version of the GSD I system which uses an Eclipse CPU can upgrade to the GDS II for \$10,000, the spokesman noted.

A typical system with 80K core memory, magnetic tape drive, disk drive, Digital Equipment Corp. Decwriter, dual 19-in. CRT with constrained cursor, California Computer Products, Inc. 960 plotter and floating-point board costs \$250,000.

Calma is at 707 Kifer Road, Sunnyvale, Calif. 94086.

## DEC Disk Subsystem Fits PDP-11, VAX-11

MAYNARD, Mass. — Digital Equipment Corp. has introduced two large-capacity disk drive subsystems for use with the PDP-11/70 as well as the recently introduced VAX-11/780 [CW, Oct. 31].

The disk subsystems use the RM03 disk drive and include controllers to allow the drive to be attached to the minis, DEC said.

The RMO3 drive handles 67M bytes of storage; a single subsystem can be expanded to 536M bytes of on-line formatted capacity, a spokesman said.

## Serial Printer, Teleprinter Added By Decision Data

HORSHAM, Pa. — Decision Data Computer Corp. has introduced a printer terminal and a serial printer for minicomputers.

Forms can be moved both forward and in reverse in partial line increments, Decision Data said. This reportedly allows the units to print business graphs, charts and mathematical expressions.

The printers have a 96-character set of symbols and a print line of 132 positions. Both require an RS-232-C interface.

The Model 3240 printer terminal sells for \$2,850 and the Model 6540 is priced at \$2,395. Decision Data is at 100 Witmer Road, Horsham, Pa. 19044.

## Cabinet With Fan Holds 300 Disks

PALO ALTO, Calif. — A disk cabinet with a "clean room" package is available from Minicomputer Accessories.

The storage system includes a two-drawer cabinet, filter and fan. It can hold up to 300 floppy disks.

The fan circulates cleaned air through the cabinet, forcing out dust and dirt, the company claimed. When a drawer is opened the rush of clean air out of the cabinet prevents dust from settling on the contents.

The cabinet costs \$295 plus shipping and applicable sales taxes, the firm said from 1015 Corporation Way, P.O. Box 10056, Palo Alto, Calif. 94303.

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# Keeps Membership Data Up-to-Date Mini Helps Industry Group Flow Smoothly

By Esther Surden

CW Staff

DENVER — Every industry has an association whose mandate is to keep membership up-to-date on issues concerning its specialty. But just keeping track of the membership has become an increasingly complex problem as associations grow and add functions.

One such organization the American Water Works Association here, is keeping track of more than 26,000 members using an on-line minicomputer system.

Founded in 1881, the association is dedicated to improving both the quality and quantity of water available, according to Ralph Uhlenburg, director

of administration. When the present water crisis increased the demand for the organization's services, it turned to a service bureau.

But that soon became inadequate. "We were faced with continuously rising costs," Uhlenburg recalled, "and we wanted an on-line system."

The service bureau updated the membership lists monthly while the organization prepared labels daily, and "sometimes we were issuing incorrect labels," he said.

The association decided to study in-house DP systems. Uhlenburg received quotations from 16 different vendors and service bureaus and then contracted with a consultant to come

up with an independent recommendation.

Both the consultant and Uhlenburg arrived at the same conclusion — that the Microdata Corp. Reality system with software written by a local vendor would be the best solution.

The major reasons for choosing the system were its ability to fit into an office environment, its on-line capability and its ability to accommodate variable-length records, Uhlenburg said.

The association had been locked into fixed-length records on the service bureau's IBM 360 system, he explained.

Preparing three labels for various publications is one of the system's ma-

ior tasks, along with keeping tabs on the payment of dues, address changes and other roster information. In addition, the system tracks orders and invoices for the publications.

## Speeds Cash Application

"We are able to process our cash application in one day; it formerly took a week," Uhlenburg said. The system also enabled the organization to reduce personnel by one person.

The system has 24K of core memory, a 10M-byte disk drive, a 300 line/min printer and two CRT terminals. The software was developed by Electronic Systems of Colorado, customized to the association's application, and "we wouldn't have it any other way," Uhlenburg said.

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## Ampex Add-On Fits DG, DCC

EL SEGUNDO, Calif. — Ampex Corp. has an add-on memory designed for users of Data General Corp. and Digital Computer Controls, Inc. (DCC) equipment.

The ARM-1280 provides 16K words of memory and is reportedly pin-compatible with all Nova 800 and 1200 and DCC D116H and D116S minis.

## Selectable Speed

Memory cycle speed is switch-selectable to match the performance requirements of each of the models, Ampex said. Cycle time is 800 nsec, for the Nova 800, 1,200 nsec for the Nova 1200 and DCC D116S and 960 nsec for the DCC D116H.

Contained on a single board, the unit can be plugged into any memory slot and will operate in any address field up to the maximum addressable field in any of the models, according to the vendor.

The ARM-1280 costs \$1,725 from Ampex at 200 N. Nash St., El Segundo, Calif. 90245.

## Mini Locks Out Tardy Borrowers

(Continued from Page 51)

library books in the various branches. This was primarily a library personnel effort, Terrell said, and resulted in the development of the library data base.

## No DP Personnel

The system performs a number of functions for the libraries, all without the help of DP personnel. Aside from checking the books in and out, it prepares overdue notices on a daily basis and alerts the terminal operator when a book placed on reserve is checked in.

That night a notice that the book is in the library is mailed to the patron who requested it.

The operator is also alerted when a patron with an overdue book tries to take out another book. This effectively "locks out" delinquent borrowers.

All of the functions the system performs contribute to the statistical reports that are issued on a daily and a monthly basis. The reports are produced off-line.

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## Micro Bytes

### LSI-11 Types Gain Wire-Wrap Boards

SAN CARLOS, Calif. — Artec Electronics, Inc. has introduced two wire-wrap printed circuit (PC) boards for users who want to build their own Digital Equipment Corp. LSI-11-type I/O and memory systems, according to a spokesman.

The full-size board, totally uncommitted and designed for the insertion of wire-wrap pins, can accommodate approximately 130 standard 14-pin and 16-pin dual-in-line packages (DIP) plus passive components.

Artec's half-size version, 5.225 in. wide by 8.4 in. high, sells for \$35. The full-size version, 10.45 in. wide by 8.4 in. high, costs \$75 from the firm at 605 Old County Road, San Carlos, Calif. 94070.

### Cassettes Protected

WALLINGFORD, Conn. — Certified digital cassettes that are designed for use on home computers have been announced by Good Image, Inc.

Each cassette contains 290 ft of tape that is certified at 800 bit/in. and is labeled, boxed and sealed for environmental protection, according to a spokesman.

The cassettes sell for \$4.79 each from Good Image, 412 South Cherry St., Wallingford, Conn. 06492.

### Micro, Phones Linked

LAFAYETTE, Ind. — A module that permits bidirectional communications between a microprocessor and the telephone system was announced by the Wintek Corp.

The Wince Touch-Tone Transmit/Receive Module can be used in such applications as automatic telephone dialing/receiving, automatic credit card verification, point-of-sale terminals and mobile radio telephone systems.

It is available on a 44-pin printed circuit board for \$1,499 from Wintek at 902 N. 9th St., Lafayette, Ind. 47904.

### Prom Matrix in Kit

MAMARONECK, N.Y. — A programmable read-only memory (Prom) matrix kit has been introduced by the Sealectro Corp.

The board comes with 10 diode pins to provide "simple" byte programming with visual read-outs by means of a pin display, according to the vendor.

The Prom matrix kit sells for \$37.50. Sealectro is in Mamaroneck, N.Y. 10543.

### Correction

One- through four-year lease rates on the Texas Instruments, Inc. Model 810 microprocessor controlled printer [CW, Nov. 7] were reduced \$15/mo.

# Hobby Fest Set for NCC . . .

MONTVALE, N.J. — A Personal Computing Festival will be featured June 6-8 at the 1978 National Computer Conference, scheduled for the Disneyland hotel complex in Anaheim, Calif.

Hobbyists, consumers, students and computer professionals are invited to participate in the festival, which will include exhibits of personal computing products and services, a program of papers and presentations and a display of individually designed personal computing systems and applications.

Approximately 30 sessions are planned as part of the festival. They will cover such topics as graphics, music systems, speech synthesis, computer games, computers for the physically handicapped, software design, optical scanning and floppy disk systems.

The Festival Program Committee will review and select papers from those submitted for consideration. These papers and presentations will be gathered in a soft-bound volume, *Festival Digest '78*, which will be available during the festival.

Prizes will be awarded for the most innovative hardware and software systems and applications. These will also be on display throughout the festival.

A portion of NCC's professional program and the professional development series will concentrate on subjects closely related to personal computing. The primary intent of these presentations will be to bring those in the computing field up-to-date on personal computing and its

future direction, organizers said.

Both one-day and three-day registrations are available for the conference. Additional information is available from the NCC sponsor, the American Federation of Information Processing Societies, Inc., at 210 Summit Ave., Montvale, N.J. 07645.

## . . . Papers Sought

MONTVALE, N.J. — A call for papers — and session chairmen — has been issued for the Personal Computing Festival to be held in conjunction with the 1978 National Computer Conference June 5-8 in Anaheim, Calif.

Included as part of the three-day program that will begin one day after NCC opens will be presentations of invited papers, contributed papers and tutorials, as well as panel discussions relevant to personal computing.

Approximately 30 sessions are planned for the festival, according to Jim C. Warren, chairman of the program.

Emphasis will be on tutorials for computer novices, speech synthesis and recognition, computer-driven and assisted music systems, computer graphics and art, personal computers for the

physically disabled, computers for education, business systems using "home" computers, hardware and software design and computer implementation.

Papers and session proposals on other topics are also encouraged, Warren noted.

Potential authors should send a "letter of intent" including an abstract of their proposed topics to Warren as soon as possible. They will then be mailed the Festival Author Kit, which contains instructions and materials for preparing camera-ready copy.

People interested in chairing sessions should submit by Feb. 1 two copies of a 250-word abstract describing the scope of their proposed sessions and a tentative title of presentations to Warren at Star Route, Box 111, (Continued on Page 58)

## TDL Makes Four Offerings

PRINCETON, N.J. — Four products — a data base management system (DBMS) a text-editing language, a video interface board for S-100 micros and a wiring accessory for its own System Monitor Board (SMB) — have been introduced by Technical Design Labs, Inc. (TDL).

Micro-Seed, DBMS designed to operate on TDL's Xitan Z80 microcomputer, will support both hierarchical and network data structures, providing both schema and subschema views, TDL said.

The package consists of a data definition language processor that checks and compiles the data definition into a schema table; data manipulation language subroutines that can be invoked from Fortran or Assembly language programs to retrieve and update the data base; and a data base initialization program that prepares a disk area for the loading of a data base, according to a spokesman.

Micro-Seed is applicable to any situation that involves working with data in the hobby, scientific or commercial fields, TDL said. The price of the package, which requires the TDL Z80 disk system configuration and an additional 48K of memory, is \$1,250.

The Z80 Text-Editing Language (Z-Tel) software is a utility program that provides a set of techniques for manipulating and editing text files, TDL said. It was designed for the user who requires absolute control over his text environment, the spokesman noted.

Some features of Z-Tel include the ability to move large blocks of text around inside the buffer; the ability to write macro expressions which become actual text-editing programs; an expression evaluation capability; and branching and conditional branching commands within the text-editing structure, TDL said.

A read-only memory program that requires less than 7K Z-Tel is available for \$50 on paper tape and for \$40 on cassette.

The Video Display Board (VDB) S-100 bus microcomputers consists of two boards joined "piggyback" style; only one acts as a connector on the bus, the spokesman said.

The VDB contains its own display buffer memory and provides two pages of display, each with 25 rows of 80 characters, he added.

It also features 96 upper/lower case Ascii characters with descenders and 64 unique symbols, permitting a graphic resolution of 160 horizontal elements by 75 vertical elements. The display can accept data at 400,000 char./sec, TDL said.

The VDB does not require a high-resolution monitor but can work with a modified television set or available video monitor. It is priced at \$349 in kit form and \$499 assembled.

### Interface One

The final product introduced, Interface One, is a "plug-in" connection that eliminates the necessity of hand-wiring the 26 wires of the SMB ribbon cable to its I/O devices, TDL said.

Interface One consists of a PC board into which are soldered three female DB25 connectors and one male flat ribbon connector. The module is also accompanied by a ribbon cable with female connectors on both ends.

The module includes an 18-in. length of ribbon cable with molded connectors on each end to connect the Interface One to the SMB. Both serial I/O ports (teletypewriter and video) of the SMB as well as the parallel port lines are each brought to a separate connector.

The board can be mounted to the inside back of the Xitan computer system or any other cabinet that will accept three DB25 connectors on 1-in. centers, the spokesman noted.

The price of the interface, with all necessary mounting hardware, is \$27 in kit form and \$40 assembled and tested. TDL is located at Building H, Research Park, 1101 State Road, Princeton, N.J. 08540.

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## Honeywell

**Bit** — 1. Bit is an abbreviation for binary digit. Most commonly a unit of information equalling one binary decision, or the designation of one or two possible and equally likely values or states, usually conveyed as 1 or 0 of anything used to store or convey information such as 1 or 0, which may also mean "yes" or "no." 2. A single character in a binary number. 3. A single pulse in a group of pulses. 4. A unit of information capacity of a storage device. The capacity in bits in the logarithm to the base two of the number of possible states of the device.

**bit slice microprocessor** — The bit-slice microprocessor represents a new class of semiconductor device for computers. Bit-slice circuits are being produced in Schottky-TTL form by many companies. One of the first was Intel's 3000 series chip, two bits wide, but other manufacturers are offering slices four bits wide. Some are building chips with integrated injection logic (I<sup>2</sup>L), and others are building chips of emitter-coupled logic (ECL).

**blocks** — Records are transferred to and from tapes in the form of blocks (sometimes called physical records). A block (physical record) may contain one or more records (logical). Records may be reduced to blocks on tape to reduce the acceleration and deceleration time.

**Boolean algebra** — A mathematical system of logic named after George Boole, English mathematician and logician. It deals with classes, propositions, on-off circuit elements, etc. Associated by operators as AND, OR, NOT, EXCEPT, IF... THEN... which permits computations and demonstrations as in any other mathematical system.

**bootstrap** — 1. A technique or device designed to bring itself into a desired state by means of its own action, e.g., a machine routine whose first few instructions are sufficient to bring the rest of itself into the computer from an input device. 2. To use a bootstrap. 3. That part of a computer program used to establish another version of the computer program.

**branch instructions** — An instruction logic which when executed may cause the arithmetic logic unit (ALU) to obtain the next instruction from some location other than the next sequential location. A branch is one of two types: conditional, unconditional.

**breadboard** — Usually refers to an experimental or rough construction model of a process, device or construction.

**break** — Can refer to either an open circuit or an interruption in transmission to allow transmission from the other end.

# LEARNER'S LEXICON

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**COMPUTERWORLD**  
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## In New York, Anaheim

# 'Impact' Seminars Scheduled for Both Coasts

NEW YORK — A one-day conference on "The Impact of Personal Computers," sponsored by The Yankee Group, a consulting firm, will be held in New York City on Dec. 6 and in Anaheim, Calif., on Dec. 9.

Four speakers will address topics of personal computing organized under eight headings: "The Effect on the Small Business Computer Market," "The Effect on the Sophisticated Pro-

grammable Calculator Market," "The Development of a Home Market," "Technology," "Applications," "Markets," "Communications" and "Impact: Future."

The featured speakers are Alan Kaplan, Dr. Portia Isaacson, Carol Ogden and Howard Anderson.

Kaplan has researched "the effects of emerging semi-conductor technology into personal computers."

Isaacson, who is involved in the ownership and management of several retail computer stores, is president of the Computer Stores Retailer Association. She organized this year's National Computer Conference symposium on personal computing.

Ogden, technical director of Software Technique, Inc., has researched minicomputer design and applications. Anderson, president of The Yankee Group, is a past speaker at Yankee Group seminars on data communications topics.

"The first impact of personal computing will be on the small business computer," according to a spokesman for The Yankee Group. "A substantial part of this market will be stolen by an upward migration from personal computing."

"The second impact of personal computing will be on the home market ... Home computers are an upward mi-

gration from programmable calculators.

"The third impact of personal computing will be on communications. The first thrust will come from personal business computers with a need to exchange information."

"The second may come from innovative electronic mail delivery systems and true dispersed processing applications," the spokesman said.

The registration fee for the conference is \$300; the fee is \$250 each for additional attendees from the same company. The fee includes attendance at all sessions of the conference, "The Yankee Group Research Manual" and lunches.

The Yankee Group's mailing address is P.O. Box 43, Harvard Sq., Cambridge, Mass. 02138.

## Space Byte 8085 Debuts

LOS ANGELES — A microprocessing unit (MPU) with full I/O capabilities and 256 bytes of random-access memory (RAM) has been introduced by the Space Byte Corp.

The Space Byte 8085 features two RS-232C serial I/O ports, one for a CRT and the other for a printer. Both have software-selectable transmission rates, the firm said.

The 8085 operates at 3 MHz, uses a 450 nsec memory and is fully compatible with all 8080 software, a spokesman claimed. It also has a 1.302 microsec minimum instruction cycle time, he added.

This MPU card, containing an S-100 bus, provides all the facilities necessary for operating a disk system, console CRT or high-speed serial printer, Space Byte said.

The MPU is delivered complete with

tape and disk software resident in programmable read-only memory, four vectored interrupts and a programmable 14-bit binary timer/counter.

The price of the unit, which can reportedly serve as the heart of its own software development system, is \$499. Space Byte is at Suite 201, 1720 Pontius Ave., Los Angeles, Calif. 90025.

## Papers Sought for NCC

(Continued from Page 55)  
Redwood City, Calif. 94062.

In the case of panel sessions, a potential organizer should list proposed panelists, their titles and affiliations and a brief biography of each speaker.

Applicants will be notified on the disposition of suggested sessions by Feb. 10.

Papers that are presented during the festival will be published in a soft-bound book, *Festival Digest '78*, which will be available during NCC.

Information concerning the festival or NCC in general can be obtained from the sponsor, the American Federation of Information Processing Societies, Inc., 210 Summit Ave., Montvale, N.J. 07645.

## NEC Aids Users

LEXINGTON, Mass. — NEC Microcomputers, Inc. has published documentation for its UPD371 magnetic tape cassette/cartridge controller, according to a spokesman.

The 58-page users manual provides a product description, including timing and circuit diagrams.

The manual costs \$10 from NEC at 5 Militia Drive, Lexington, Mass. 02173.

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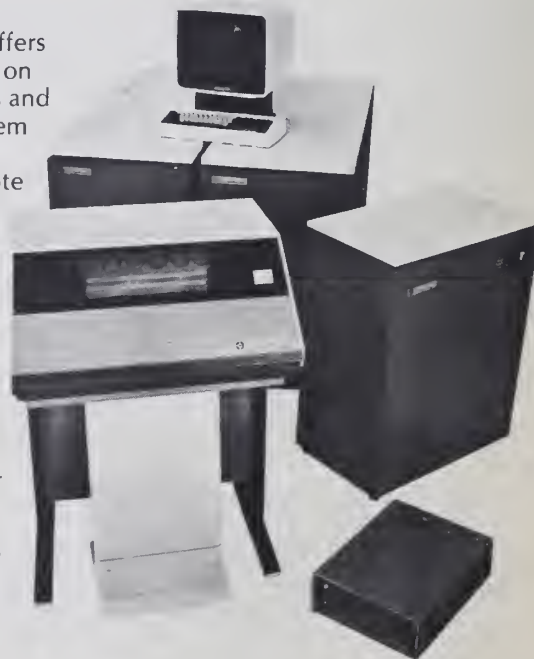
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## McAdams' Figures Show

# IBM Stunted Tape, Disk Makers' Growth

By Catherine Arnst  
CW Staff

NEW YORK — IBM's success in impacting the growth of disk and tape drive manufacturers can be seen by studying the market shares for those products, according to testimony by Dr. Alan McAdams, the government's chief economist, at the U.S. vs. IBM trial here.

IBM had 70% of the tape drives installed domestically on IBM systems and 72.7% of the disk spindles as of 1975, according to charts developed by McAdams and two of his staff members, Richard Baeyen and Charles Osborn, for the trial.

The firm's market share of tape and disk drives corresponded closely to its share of the computer market, which was 72.2% in 1972, according to other McAdams charts [CW, Nov. 7].

Consequently, even though the economist only measured tape and disk drives installed on IBM computer systems, those systems make up the bulk of the market, by his calculations.

With disk spindles, McAdams developed percentage figures for the IBM 2311, 2314/-2319, 3330 and 3340-type disk drives for the years 1970 through 1975. The percentage plug-compatible manufacturers (PCM) had for each of these models got smaller as IBM introduced newer products.

In the disk drive market, PCMs gained a larger share of the market until 1972, when their growth leveled off, according to the charts. In August 1972, IBM made its "smash" announcement (so-called by internal IBM documents), which bundled the control unit for the disk drive with the CPU on the 370/158 and 168, as well as several

other price cuts and interface changes.

These design changes were made to lock out competitors from the disk market and so were predatory actions, McAdams claimed.

Prior to Smash, IBM's market share dropped 19.3% between 1970 and 1972. It had 92.3% of the installed base in 1970 and 77% in 1972. Between 1972 and 1974, however, the firm's share dropped only .7%, to 76.3%. In 1975, the PCMs did make some inroads into the 3330 disk-type market (increasing their share from 19.1% in 1974 to 26.7%, which caused IBM's overall share to drop 3.6% to 72.7% in 1975).

### Tape Drive Arena

In the tape drive market, McAdams looked at the market share of IBM 729, 240X, 2420 and 2320-type tape drives for the years 1967 through 1975.

## Series/1 Sales Seen Moving Through OEMs to End Users

By E. Drake Lundell Jr.  
CW Staff

ATLANTA — Apparently even IBM has to go through the normal growth cycle in the minicomputer "iron" marketplace, according to its experiences in the first year of marketing the Series/1 mini.

In this cycle, firms generally do most of their initial business with OEMs and systems houses, then add improvements that make the product more appealing to end users with a resulting increase in end-user business.

In a graph developed by McAdams' staff depicting the market share of IBM, Potter, Telex, Storage Technology Corp. (STC), Control Data Corp. and "others" all the PCMs showed very moderate rates of rise or decline except STC. This firm's share rose from zero in 1970 to 15.7% in 1975, whereas no other firm's share ever rose to more than 7%.

However, STC was never a great financial success, according to the testimony of Jesse Aweida, a cofounder [CW, May 30].

IBM's share of the installed base of tape drives has dropped steadily since 1967, when it had 99.3% of the market. The greatest loss was experienced between 1968 and 1971 when its share dropped at an average rate of about 5% a year. In 1970, IBM announced the 3420, which was similar to the 2420 but lower in price.

And that's just about what is happening to IBM, according to Robert M. Umbreit, worldwide director of special systems requirements for the firm's General Systems Division and the man in charge of market planning for the Series/1 since it was announced Nov. 19, 1976.

Admitting that the Series/1 was a "different" concept for IBM initially, Umbreit said IBM was surprised by the degree of acceptance for the product in the OEM and systems integrator marketplace, particularly since IBM does not offer quantity discounts like most minicomputer companies do.

Apparently, he said, the IBM reputation for service and the widespread availability of its service organization are the major reasons for this.

The OEMs "seem to feel that is a marketable quantity," he said.

### More Than 50% OEM

Presently, more than half of IBM's Series/1 business is with OEMs, Umbreit said, adding that IBM had anticipated a larger end-user content in its first year of shipments.

In either case, however, he indicated that IBM has been going after the multiple-unit (Continued on Page 60)

## Committee to Manage Entrex

BURLINGTON, Mass. — Nixdorf Computer AG has initiated a management change at Entrex, Inc. Former president and chief executive officer Donald Feddersen was replaced with a four-man management executive committee.

The committee will oversee both Entrex, Inc. and Nixdorf Computer, Inc., both of which are owned by the German firm Nixdorf Computer AG.

Feddersen resigned by mutual agreement, according to Tom Conway, who recently moved from vice-president of finance to ex-

ecutive vice-president and chairman of the executive committee.

Others on the committee are Ken Butler, recently named executive vice-president, who will retain responsibility for marketing; Eric Jackson, senior vice-president, engineering and development; and John Lyons, senior vice-president, manufacturing.

Conway said Feddersen was the only employee to depart during the recent shuffle.

No changes in Entrex' product line are anticipated, he indicated.

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# ICL Planning Moves to Penetrate U.S. Market

By Molly Upton  
CW Staff

NEW YORK — ICL, Ltd. has a number of product enhancements up its sleeve in its efforts to penetrate the U.S. marketplace, officers indicated at a press conference here recently.

In addition to the System Ten Accounting and Reporting System II (Stars) announced for the upgraded System 220 series, ICL expects to offer Cobol on its 1500 terminal, according to Kenneth Billings, vice-president of systems support.

Geoffrey D. Rowett, president of the marketing division, said ICL's thrust in the U.S. is in the area of smaller products in order to establish a base upon which it can build. "It would be stupid to bring in big products" at

this point, he said.

ICL looked at the U.S. market for some time and then bought manufacturing facilities in Utica, N.Y. from Singer Co.

Now, it is "high time we attacked the largest market. You cannot be an international success without being in the U.S.," Rowett remarked.

Since introducing the System 220 in June in the U.S., ICL has sold 17, which Rowett termed "pretty impressive."

In the seven months since the system was announced in the UK and Europe, over 600 have been sold, he added.

Software for the System 10, 220 series includes data management facility (DMF-2), assembler, sort and Stars II, and there will be further software

for particular markets, he added.

Intermark Systems of Dallas created the Stars-II, which provides order entry, general ledger and trial balance capabilities, Rowett said.

ICL expects the 220's chief market will be wholesale distributors.

The 1500 is directed at service bureaus and large firms' remote data capture and communications functions, he said, as well as large telephone companies.

The 1500's current software includes a data entry language and PTE, a disk-oriented language.

With the 2903 series, ICL is attacking the System/3 market, but initially on a limited geographical basis. The advantages of the 2903 versus a 3/15 are direct data entry, communications

capabilities and a lower price, he said.

The initial campaign, called "Exit 3," centers on the New York, New Jersey and Philadelphia area, according to Rowett. "There are no immediate plans to attack the System/3 nationwide until we can prove we can do what we think we can," he said.

To lure System/3 customers, ICL will aid in data conversion. The 2903 uses RPG, but with a different word structure, Billings explained.

ICL provides service on the 2903 while TRW provides maintenance on the System Ten and the 1500, Rowett indicated.

## More End Users Buying Series/1

(Continued from Page 59)

buyer marketplace, whether it was OEM or end users and that the system is "just about on plan."

These users — who may be installing up to 100 or more minis for a single application or in a distributed network — want a system that has tightly controlled hardware and software, he said. They don't want systems that have extra capability they can't use since they have to pay for that capability and those costs can mount up very fast for users buying many systems, he indicated.

That's why IBM went with the modular approach for both hardware and software with the Series/1, he said.

In particular, the system is designed for people who don't want "manufacturer-dictated" operating systems in that it allows them to design their own operating systems or purchase them separately.

### End-User Business

While the first year's U.S. business for the firm has been more than 50% to OEMs, Umbreit said end-user business was picking up in recent months and that the firm had been selling to more end users than OEMs in Europe right along.

End users, he said, have been less willing to add independent peripheral devices to the Series/1 than was expected so there has been a lot of pressure on IBM to add more peripherals and software to the system.

"We will need to upgrade the system over time," he said, adding that IBM currently has an "active development program" for the system.

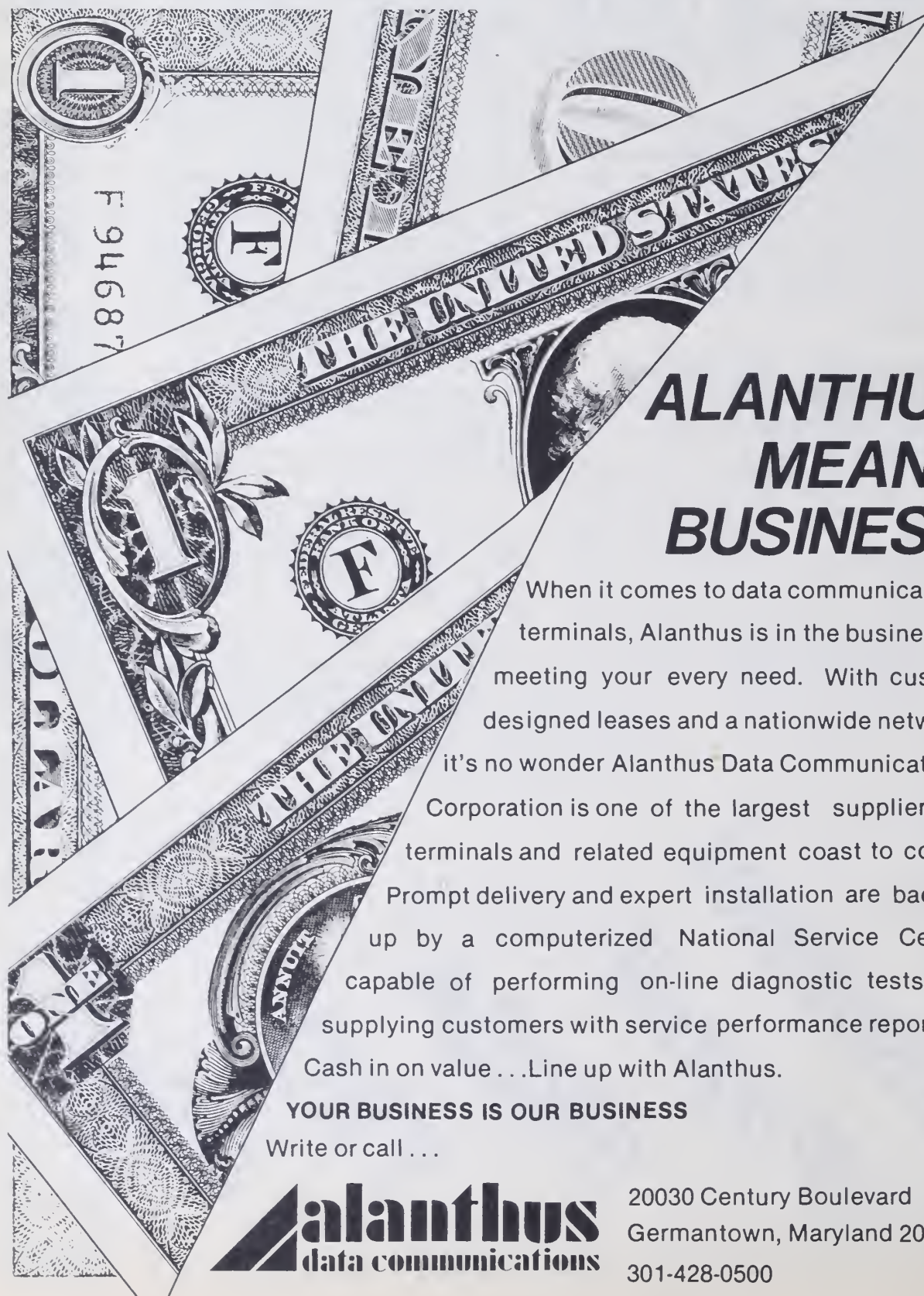
The biggest pressures from Series/1 users today are for a larger disk, keyboard CRT, Cobol and a data base management system, Umbreit said, indicating IBM wants "to fill user needs."

In addition, he indicated that superminis in the 32-bit class of machines were the fastest growing area in the field and that IBM "probably couldn't ignore this field forever."

There is also a great deal of user interest in Fortran and PL/I, he said, with European users showing more interest in PL/I than U.S. users.

While many had felt that the introduction of the Series/1 would lead to competition with other minis within the IBM organization, Umbreit said that to date the Series/1 had mainly created new business for the firm.

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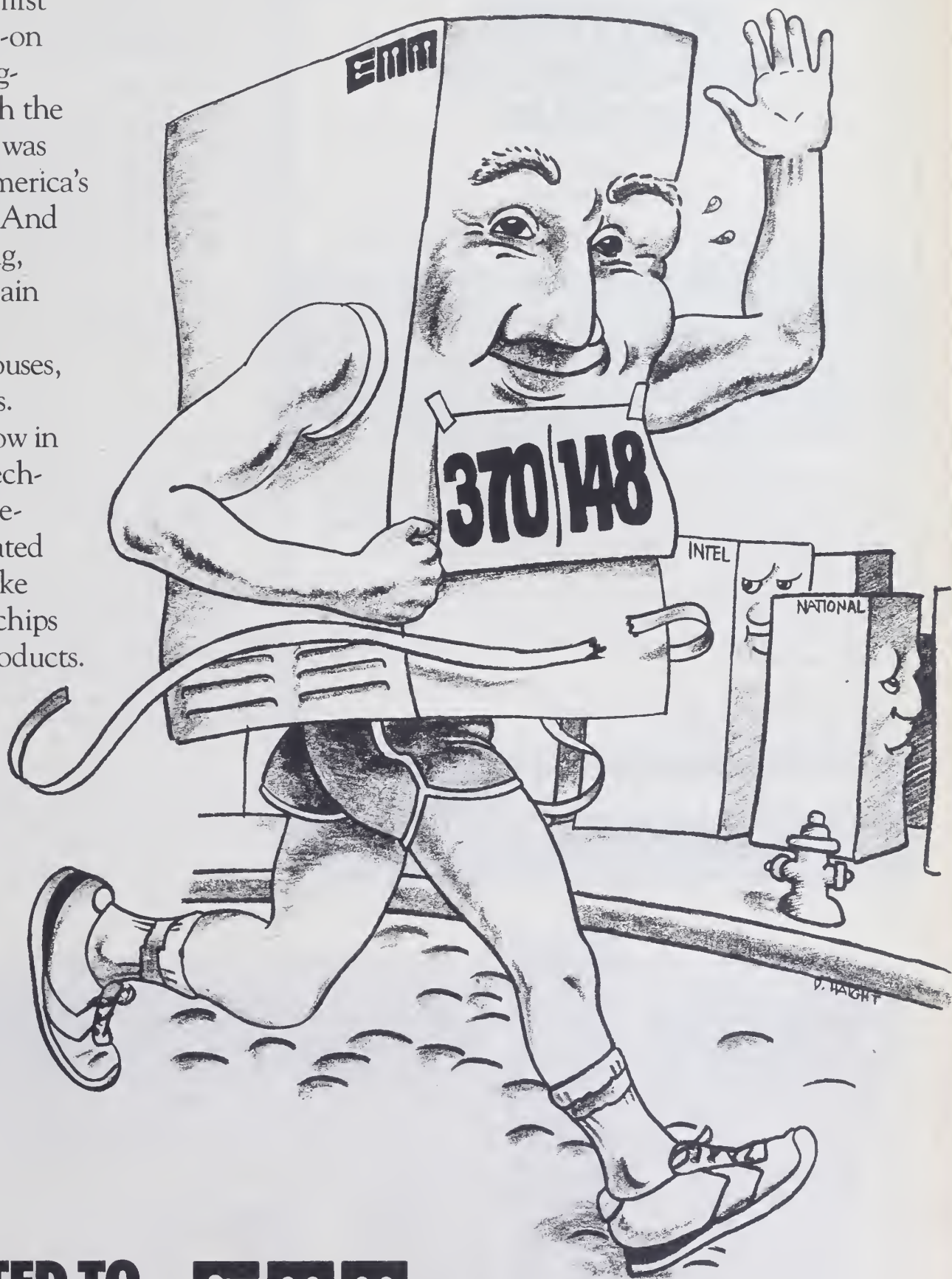
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## Judge Asks Memorex To Outline Issues

SAN FRANCISCO — Preparations for the Memorex Corp. vs. IBM anti-trust trial, scheduled to begin in January, are proceeding. However, the most recent filings were made under a protective order and thus are not available to the public.

Judge Samuel Conti asked Memorex for a statement of proof, indicating he would not welcome the idea of a trial that simply presented a rerun of issues that had been tried previously in other courts. IBM has also filed its statement.

Conti will hold a pretrial meeting here Nov. 21.

### Play It Again, George?

CUPERTINO, Calif. — Having founded one company — Diablo Systems, Inc. — George Comstock is at it again, this time with a venture called Durango Systems, Inc., which intends to design and manufacture a family of small business systems.

Joining Comstock in founding Durango are other old Diablo hands:

## CI Notes

John M. Scandalios, formerly vice-president of operations at Diablo, who will be responsible for marketing and Charles Waggoner, formerly Diablo director of engineering.

And Sutter Hill Ventures, which arranged the financing of Diablo Systems in 1969, is providing lead financing for Durango along with Citicorp Venture Capital, Ltd.

Scandalios indicated Durango products will be marketed in North America, Europe and the Far East, primarily through a network of distributors and dealers.

Three years after Diablo was started, it was acquired by Xerox for stock valued at \$29 million in 1972.

### DEC Buys LEDs

MARLBORO, Mass. — Digital Equipment Corp. has selected Data Display Products' light-emitting diodes (LED) as field replacements in its fixed-mount bezel display panel for PDP-10s, according to John Shebell, who is head of maintainability for the large engineering group at DEC.

The LEDs were selected because of their reliability, Shebell stated, adding DEC has demonstrated a mean time

between failure of over five years in the field.

With a fixed-mount bezel such as that found on the PDP-10, replacement is an awkward process, he said. The long life of the LEDs and the elimination of more frequent replacement of incandescent lamps should more than compensate for the increased cost of the parts, he indicated.

DEC is not using LEDs on its newer Decsystem-10s because they do not have lights, Shebell said.

### Amdahl Production Up

SUNNYVALE, Calif. — Amdahl Corp. increased its production capacity 25% during the quarter ended Sept. 30, up from four systems per month to five, the firm stated in a financial report.

During the third quarter it shipped 93% as many systems as it did during the first three quarters last year, the firm added.

Amdahl plans to add another 25% increase in capacity during the fourth quarter when a manufacturing facility now under construction is completed.

With its increased production came increases in personnel. During the quarter, employment rose 26% to 1,500 about 91% greater than at the beginning of the year, Amdahl indicated.

During the latest quarter, Amdahl was directly leasing two systems to customers.

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## Supershots

BASF Systems, Inc. intends to begin shipping its version of the mini floppy disk in March or April.

Mohawk Data Sciences Corp. plans to announce expansion capabilities for the models 21/20 and 21/40 within the next few months and will introduce a new model within the Series 21 family before next April, Ralph H. O'Brien, chairman and president, told a recent stockholders meeting.

Dr. Lewis M. Branscomb, chief scientist and vice-president at IBM, will chair the Committee on Scholarly Communication with the People's Republic of China, which promotes scientific, technical and academic ex-

changes between the U.S. and that country.

Sycor, Inc. has elected Data Systems of Traverse City, Mich., as a distributor for Michigan's lower peninsula.

CPC International, Inc. has sold its interest in Information Science, Inc. to the Edgar B. Mitchell Corp., headed by the ex-astronaut of the same name.

We all know about stockholder meetings, but Centronics Data Computer Corp. recently held its second annual employees meeting, which honored more than 100 employees who have been with the company for more than five years.



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# Basic/Four Sets Sights on Big, Distributed Sites

# After First 18 Months CA Seeking to Control Growth of Syfa Sales

IRVINE, Calif. — About a year and a half after Computer Automation, Inc. (CA) introduced its Syfa system, about 150 such systems are in place at approximately 15 customer sites, according to Ivan Socher, general manager of the firm's Commercial Systems Division.

"The fewer customers we have, the better," Socher continued. CA has never been production-limited, he explained. "but the fear is that we will become support-limited." As time goes on, it is becoming tougher and tougher to control sales growth for the system, despite the fact that CA has not added a salesman in a year and has no plans to, he stated.

The Syfa system is sold in the distributed processing marketplace, but Socher preferred not to give a precise definition of the term. Distributed processing "is whatever suits the speaker or the listener," he noted. He did

venture the opinion that distributed processing has nothing to do with computers, but rather relates to how all work is processed throughout an organization.

"What we appear to be supplying to people are data networks," Socher pointed out.

Decentralization, however, is "no doubt" the wave of the future, but at the moment the industry could be headed into an "unbalanced situation," he said. Centralizing all applications was at one time the only way of doing things, he noted, adding that now people are saying "Why don't you distribute all of the processing."

"I'm not sure its going to hit a happy medium," he continued, "but the manufacturers are going to win no matter what happens."

Acceptance of decentralization won't happen "at the pace you hear talked about," he predicted, because "IBM decided it's not going to hap-

pen at that pace . . . it's far too expensive for IBM to do it."

## Hard to Control

What makes the Syfa system's growth so hard to control? "It wins benchmarks," Socher said. The Syfa offers a better price/performance than any comparable system, he claimed. No one particular system feature sells it, but the ability of all the parts of the system to work together to beat the competition is its biggest plus, he said.

Competition for the system comes from a number of quarters. "IBM is in there, but never seems to have the same product," he noted. The mainframer has bid systems ranging from the IBM System 32 to the 3033 against the Syfa, he explained, adding that "We never miss DEC" in a bidding situation. "It never [initially] goes in with the 11/70 but we always end up competing with the 11/70," he said. Hewlett-Packard Co., Datapoint Corp. and Data General Corp. are other competitors for the sys-

tem.

Socher noted that the Syfa performs three functions well: data capture, local processing and communications.

It will not win in situations in which any one of the functions is needed to the exclusion of the others or an unbalanced situation, and the firm prefers to withdraw from bids that require this, he said.

About 80% of the business done with the product results from references from existing customers, he added.

## Contracts

Computer Network Corp. has been awarded a facility management contract valued at approximately \$3 million by MCI Telecommunications Corp.

Data Dimensions, Inc. has

entered into a systems management contract with W.H. Sadlier, Inc. of New York City. The work will be processed at Data Dimensions' data center in Greenwich, Conn.

Keane Associates, Inc. has received a two-year contract from the State of Rhode Island to develop an integrated state payroll and personnel system. The contract is valued at over \$150,000.

Cambridge Memories, Inc. has been awarded a contract by the Automated Data and Telecommunications Service of the General Services Administration to provide core memory systems to federal agencies using certain models of IBM computers.

Sorbus, Inc. has signed a five-year national service contract with Omnitech Data of Phoenix, Ariz.

The Western Union Telegraph Co.'s Government Systems Division has been awarded a contract to provide a digital data communications system consolidating high-speed data and secure voice requirements of various U.S. government defense and intelligence agencies in the Washington area. The award was made by the U.S. Army Electronics Command and represents approximately \$17.5 million in revenues over its 10-year service life.

Macrodyne Industries, Inc. has signed an agreement with Uppster Corp., which granted it the exclusive right to manufacture and assemble the Uppster Model PEP 6510 Ultraspeed nonimpact printer in North America and the exclusive worldwide right to manufacture its logic and power supply assemblies.

Datacrown Ltd. has signed a three-year contract with Agriculture Canada. The contract for DP services is valued at \$850,000 per year.

Texas Instruments, Inc. has begun a \$500,000 program with Walgreen Drug Stores to install computer systems in that chain's pharmacies throughout the U.S.

Penril Corp. has received a contract from Western Union for nationwide maintenance of its Data Communications Division product line.

Digital Equipment Corp. has signed a multimillion-dollar contract with Heath Co. for LSI-11 microcomputers and related products.

On-Line Systems, Inc. has had its contract with the Department of Health, Education and Welfare Office of Education renewed to develop and operate an automated student loan management system.

The Montek Division of E-Systems, Inc. has been awarded a \$2.1 million contract for the manufacture of 75 shipsets of automatic flight controls for the 747 series aircraft by Boeing Commercial Airplane Co. of Dallas.

Electronic Memories and Magnetics Corp.'s Severe Environment Products Division has received a contract from the Aerospace Division of Control Data Corp. to become the second-source supplier of memories for the AYK-14 program.

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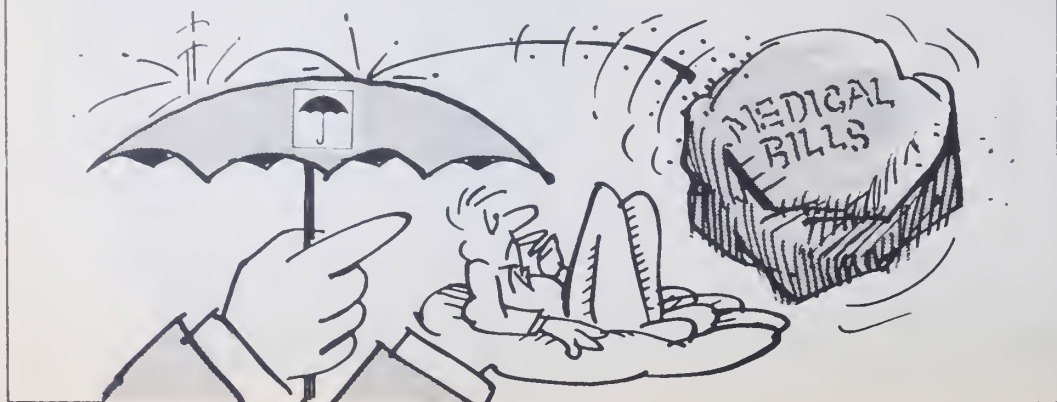
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# Microdata Eyeing Growth Above Industry Rate

By Esther Surden  
CW Staff

IRVINE, Calif. — Although "we didn't make up the loss of OEM business that left when Basic/Four Corp. built its own mini," Microdata Inc. is still growing and is "in pretty good shape," according to Donald W. Fuller, Microdata's president and chairman of the board.

In a recent interview here, Fuller said the only problem Microdata faced was that "it didn't grow like hell last year" as Fuller had publicly predicted it would. "We are not making any overly optimistic projections . . . but we still intend to grow in excess of the industry growth rate," he continued.

Microdata recently reported a drop in net income from almost \$3 million last year to close to \$2 million this year.

Right now the firm doesn't have an OEM customer that accounts for more than 10% of its business, and Fuller would like to keep things that way. In fact, although it takes a great deal of stamina and wherewithall to turn down any business, the president said that if a major company wanted to give the firm that much business "we would encourage it to take a license and go to manufacturing as opposed to having our whole production totally skewed by one large customer."

The OEM business at Microdata is built around the firm's Express Cobol-oriented mini system and a line of OEM peripherals introduced at the National Computer Conference in June 1976.

"We are selling the Express in a directed method" and only to OEMs or large-scale end users, he said. "We were late with the software," Fuller admitted, but said all those problems have been "solved."

The major reason for targeting the

## Customer Terminals Subject of Project For Savings Banks

NEW YORK — The Mutual Institutions National Transfer System, Inc. (Mints), an organization serving the savings bank industry and other thrift institutions, is instituting a project to develop guidelines for the deployment of terminals capable of providing customer-activated financial services. The guidelines will include system specifications, detailed procedures, terminal requirements and audit and control requirements.

Customer activated terminals can range from simple check-authorizing terminals to complex devices capable of providing depository services. These terminals will be deployed by thrifts both in their own branches and merchant locations. The project is intended to accelerate the rate of deployment.

The cost of the project will be borne by Mints member institutions and others such as terminal manufacturers, who wish to participate. At the conclusion of the project, each participant will receive all terminal and systems specifications and procedures (project deliverables).

Those interested in participating or learning more about this project should contact Denis Manelski, vice-president of operations at 200 Park Ave., New York, N.Y. 10017.

system at the sophisticated user is the use of Cobol. Fuller said the first-time user should be able to learn the language used on his system within a week. By concentrating on large users, Microdata "can stay out of any conflict" with the Reality dealer.

The firm does not want the dealers "to sell it to the end user at the expense of a Reality sale. It's not intended to be a single end-user system," and if it were sold to that environment, problems with support could come up.

The firm has shipped "in excess of 20 of the systems," most of which are software development machines. The first system was shipped in August.

The peripherals introduced at NCC in 1976 are also in production and about 20 of the Reflex disk drives have

been delivered and are undergoing customer evaluation. The company has moved away from just being a CPU OEM, because OEMing systems and peripherals is less susceptible to the "pricing tactics of the semis" he said.

### Attractive Features

The firm decided to add a lot of features to its peripherals to make them easy to maintain and very reliable, making the units attractive to technology-conscious companies.

However, the market is both cost- and technology-conscious, he noted, so the company needs volume to drive the cost of the systems down.

Microdata recently entered an agreement to acquire Computer Machinery Companies (CMC). The agreement

calls for Microdata to acquire 75% of the common stock of CMC/UK, Fuller noted.

The acquisition will give Microdata an entry into lucrative business abroad, he indicated. CMC, a supplier of data entry equipment, already has an able hardware and software capability in place, which Microdata intends to use to promote its product line. Presently Microdata's worldwide market is only 10% of its business, and Fuller said it could be expanded to 35% with the in-place support.

It will be a mutually beneficial agreement, he noted, because CMC needs a pipeline to the technology in this country, while Microdata avoids the cost of setting up its own extensive operating abroad.

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# Jacquard Systems Starts Small But Thinks Big

By Esther Surden  
CW Staff

SANTA MONICA, Calif. — For a small company, Jacquard Systems has some big ideas about where it would like to be in the small business marketplace.

The firm offers a multiuser, interactive system that can do both word processing and data processing as well as handle communications, according to Dick Williams, vice-president of marketing. Jacquard is a little over eight years old and was founded by President Edgar Bolton and others who came from several high technology industries.

The founders had been designing hardware and software for critical applications such as those in the space

industry, Williams noted.

For the first six years, Jacquard was a systems house dedicated to customized work. It designed such systems as an airport parking lot system that kept track of time and payments of drivers using the lot.

The customized systems led to the development of a system with a time-shared operating system that could drive multiple remote devices in a communications networking environment, Williams said.

## First Standard Product

The first standard DP product that came from the group was Jacquard's J100 system with communications capability. It was billed as a "distributed processing system" for re-

mote data base applications.

To sell such a system, however Jacquard had to market to the largest Fortune 1,000 firms, which were difficult for the small company to reach. The company decided to broaden its approach with the addition of software for generalized accounting. The J100 then became a general-purpose computer system.

In the middle of 1976, Jacquard took the J100 one step further with the introduction of a word processing software package. The package was developed in-house in response to requests from Jacquard's own staff, Williams said.

In this marketplace, the system competes with shared-logic word processing systems as well as the combination

word processing and data processing systems introduced by Digital Equipment Corp. and IBM, he noted.

The combination of word processing and data processing in the office is inevitable, Williams said. "I believe there is no way to stop these two worlds coming together," he stated, adding Jacquard plans to be in the forefront of this marketplace.

Jacquard sells its combination system through distributors. Presently there are 28 in the U.S. and several in foreign countries.

The company, which is privately held, did about half of its business overseas. Quoting the Dunn and Bradstreet report on his firm, Williams said the company made about \$2 million in sales last year and is looking forward to substantial growth next year. The firm has several hundred systems installed.

"We are really a final assembly and test plant," Williams noted. The company buys all PC boards from outside vendors and integrates them into a system.

The CPU, however, is the firm's own and is designed around a Texas Instruments IMP-16 microcomputer, which is a component of the system like other components, he stated.

Large markets for the system can be found in four professions, he stated. Lawyers, doctors, dentists and accountants are prime targets because they have large word processing and data processing requirements.

## Surprise! Your 1100 LPM Printer used up \$100,000 worth of paper this year.

CPU capacity may be getting cheaper, but computer supplies certainly aren't. Our example is true. An 1100 LPM printer running at full capacity will put out some 700,000 pages per month, at a cost of five to ten thousand dollars! (Small wonder that the charges for paper are often the biggest "surprise" in your DP budget.) The need for protecting your DP investment — often at considerable expense — has also increased. And that's why we've devoted our December 26th/January 2nd special report to the many ways to stretch your supply dollars, and safeguard your computer system.

Edited by Ann Dooley, this report — titled *Supplies and Security* — will cover a wide range of supply problems, including everything from forms optimization to analysis of management utilization of DP-generated reports. Here are just a few of the areas to be covered:

- The changing supplies market — demands on the mini user
- An overview of DP media — what to look for, how to get it
- Pooling resources — how four companies share quantity discounts

We'll also look at the practical aspects of computer security in this report, with articles like these:

- Effective contingency planning — targeting danger areas
- Computer crimes and disasters — how to cut losses and minimize risk

If you're a DP Manager, MIS Director or Corporate Executive with responsibility for DP cost control and security, be sure to read the special report in our year-end combined issue. And if you market products or services that cut the cost of computing, or safeguard what's in the computer room — advertise in this report. Ad closing date is December 9. For details, call your Computerworld salesman. To reserve your ad space, call Terry Williams at (617) 965-5800.



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## Calcomp Files For New Trial, Cites Greyhound

SAN FRANCISCO — Citing the Ninth Circuit Court of Appeals' ruling in the Greyhound Computer Corp. vs. IBM case, California Computer Products, Inc. said in its second filing with the court that it, too, should be granted a new trial.

The filings by Calcomp are appealing the directed verdict Judge Ray McNichols granted IBM last February, thus removing the three-month-old trial from the jury.

In the Greyhound case, the appeals court remanded the case for a new trial after years of deliberation over a directed verdict.

The Calcomp reply brief claimed Calcomp is "entitled to prove the whole of IBM's scheme to monopolize and to develop fully IBM's anticompetitive intent."

Calcomp refuted IBM's argument that because the Fixed Term Plan (FTP) was held lawful in the Greyhound and Telex cases, it cannot be an issue in the Calcomp case. Calcomp said the evidence it presented is "substantially different and far stronger than that presented by Greyhound."

In the Greyhound case, the court said Greyhound failed to show the FTP was "anything more than a reasonable response to competition."

IBM has petitioned the court to reply to the latest Calcomp filing, which normally would be the last filing before a decision by the court, sources indicated.

# Earnings Reports

## INFORMATION MAGNETICS

| Three Months Ended Oct. 1 |             |            |
|---------------------------|-------------|------------|
|                           | 1977        | 1976       |
| Shr Ernd                  | \$17        | \$17       |
| Revenue                   | \$8,508,000 | 8,053,000  |
| Earnings                  | (442,000)   | 373,000    |
| 9 Mo Shr                  | .18         | .85        |
| Revenue                   | 25,452,000  | 24,563,000 |
| Tex Cred                  | 48,000      |            |
| Earnings                  | 25,452,000  | 24,563,000 |

## ITEK

| Three Months Ended July 1 |             |             |
|---------------------------|-------------|-------------|
|                           | 1977        | 1976        |
| Shr Ernd                  | \$17        | \$24        |
| Revenue                   | 52,954,000  | 50,708,000  |
| Tex Cred                  | 57,000      |             |
| Earnings                  | 523,000     | 744,000     |
| 6 Mo Shr                  | .39         | .36         |
| Revenue                   | 105,513,000 | 104,063,000 |
| Tex Cred                  | 163,000     |             |
| Earnings                  | 1,208,000   | 1,126,000   |

## KEYDATA

| Year Ended July 31 |            |            |
|--------------------|------------|------------|
|                    | 1977       | 1976       |
| Shr Ernd           | \$13       | \$40       |
| Revenue            | 14,558,000 | 14,878,000 |
| Tex Cred           | 154,000    | 515,000    |
| Earnings           | 349,000    | 1,102,000  |

## LEWIS BUSINESS PRODUCTS

| Three Months Ended July 31 |            |            |
|----------------------------|------------|------------|
|                            | 1977       | 1976       |
| Shr Ernd                   | \$15       | \$22       |
| Revenue                    | 7,709,000  | 7,688,000  |
| Earnings                   | 198,000    | e309,000   |
| 9 Mo Shr                   | .61        | .63        |
| Revenue                    | 23,669,000 | 23,196,000 |
| Earnings                   | 830,000    | e913,000   |

a-Includes \$143,000 gain on insurance settlement.

## MAGNETIC CONTROLS

| Three Months Ended July 29 |            |            |
|----------------------------|------------|------------|
|                            | 1977       | 1976       |
| Shr Ernd                   | \$28       | \$45       |
| Revenue                    | 5,280,000  | 4,969,000  |
| Earnings                   | 278,000    | 431,000    |
| 9 Mo Shr                   | .89        | .88        |
| Revenue                    | 16,768,000 | 13,481,000 |
| Earnings                   | 879,000    | 837,000    |

## MEGADATA

| Nine Months Ended July 31 |           |           |
|---------------------------|-----------|-----------|
|                           | 1977      | 1976      |
| Shr Ernd                  | \$06      | \$24      |
| Revenue                   | 4,585,000 | 4,247,000 |
| Earnings                  | 74,333    | 194,673   |

## MICROFORM DATA SYSTEMS

| Year Ended July 29 |            |            |
|--------------------|------------|------------|
|                    | 1977       | 1976       |
| Shr Ernd           | \$29       | \$38       |
| Revenue            | 24,519,300 | 20,699,600 |
| Spec Cred          | 795,000    | 1,080,000  |
| Earnings           | 1,601,600  | 2,051,700  |
| 3 Mo Shr           | .20        | .12        |
| Revenue            | 8,782,300  | 5,845,600  |
| Spec Cred          | 544,200    | 379,600    |
| Earnings           | 1,091,600  | 639,900    |

## MOHAWK DATA SCIENCES

| Three Months Ended July 31 |            |            |
|----------------------------|------------|------------|
|                            | 1977       | 1976       |
| Shr Ernd                   | \$25       | \$19       |
| Revenue                    | 35,915,000 | 38,948,000 |
| Tex Cred                   | 45,005     | 545,000    |
| Earnings                   | 1,892,000  | 1,436,000  |

## MOSTEK

| Three Months Ended July 1 |            |            |
|---------------------------|------------|------------|
|                           | 1977       | 1976       |
| Shr Ernd                  | \$32       | \$21       |
| Revenue                   | 21,039,000 | 13,494,000 |
| Earnings                  | 1,362,000  | 901,000    |
| 6 Mo Shr                  | .52        | .35        |
| Revenue                   | 38,238,000 | 26,068,000 |
| Earnings                  | 2,188,000  | 1,481,000  |

## APPLIED DIGITAL DATA

| Three Months Ended Aug. 31 |            |            |
|----------------------------|------------|------------|
|                            | 1977       | 1976       |
| Shr Ernd                   | \$29       | \$33       |
| Revenue                    | 9,423,384  | 6,146,012  |
| Earnings                   | 1,611,647  | 1,249,072  |
| 9 Mo Shr                   | .75        | .86        |
| Revenue                    | 22,620,649 | 16,558,414 |
| Earnings                   | 3,837,955  | 3,273,172  |

## COMPUSCAN

| Three Months Aug. 31 |           |           |
|----------------------|-----------|-----------|
|                      | 1977      | 1976      |
| Shr Ernd             | \$02      | \$12      |
| Revenue              | 2,734,000 | 3,102,000 |
| Earnings             | 51,000    | 259,000   |

## DECISION DATA COMPUTER

| Three Months Ended Aug. 27 |            |            |
|----------------------------|------------|------------|
|                            | 1977       | 1976       |
| Shr Ernd                   | \$10       | \$12       |
| Revenue                    | 8,757,000  | 8,721,000  |
| Tex Cred                   | 136,000    |            |
| Earnings                   | 377,000    | 440,000    |
| 9 Mo Shr                   | .24        |            |
| Revenue                    | 25,170,000 | 25,542,000 |
| Tex Cred                   | 376,000    |            |
| Earnings                   | 894,000    | (152,000)  |

## DOCUMATION

| Three Months Ended Aug. 12 |            |           |
|----------------------------|------------|-----------|
|                            | 1977       | 1976      |
| Shr Ernd                   | \$26       | \$24      |
| Revenue                    | 8,991,000  | 5,447,000 |
| Earnings                   | 768,000    | 635,000   |
| 6 Mo Shr                   | .46        | .39       |
| Revenue                    | 15,274,000 | 8,733,000 |
| Earnings                   | 1,359,000  | 1,021,000 |

## ENNIS BUSINESS FORMS

| Three Months Ended Aug. 31 |            |            |
|----------------------------|------------|------------|
|                            | 1977       | 1976       |
| Shr Ernd                   | \$31       | \$26       |
| Revenue                    | 15,890,710 | 15,778,787 |
| Earnings                   | 666,718    | 577,954    |
| 6 Mo Shr                   | .57        | .50        |
| Revenue                    | 31,187,460 | 30,633,319 |
| Earnings                   | 1,240,326  | 1,108,207  |

## NATIONAL CSS

| Three Months Ended Aug. 31 |            |            |
|----------------------------|------------|------------|
|                            | 1977       | 1976       |
| Shr Ernd                   | \$80       | \$70       |
| Revenue                    | 11,865,000 | 10,340,000 |
| Earnings                   | 919,000    | 805,000    |
| 6 Mo Shr                   | 1.57       | 1.36       |
| Revenue                    | 23,439,000 | 20,494,000 |
| Earnings                   | 1,797,000  | 1,559,000  |

## MANUFACTURING DATA SYSTEMS

| Year Ended Aug. 31 |            |            |
|--------------------|------------|------------|
|                    | 1977       | 1976       |
| Shr Ernd           | \$82       | \$64       |
| Revenue            | 22,193,000 | 16,292,000 |
| Earnings           | 2,440,000  | 1,747,000  |
| 3 Mo Shr           | .26        | .16        |
| Revenue            | 6,352,000  | 4,458,000  |
| Earnings           | 780,000    | 480,000    |

## MICRODATA

| Year Ended Aug. 31 |            |            |
|--------------------|------------|------------|
|                    | 1977       | 1976       |
| Shr Ernd           | \$86       | \$151      |
| Revenue            | 37,717,000 | 31,724,000 |
| Earnings           | 1,917,000  | 2,945,000  |
| 3 Mo Shr           | .31        | .47        |
| Revenue            | 10,482,000 | 12,059,000 |
| Earnings           | 690,000    | 1,061,000  |

## TAB PRODUCTS

| Three Months Ended Aug. 31 |            |            |
|----------------------------|------------|------------|
|                            | 1977       | 1976       |
| Shr Ernd                   | \$58       | \$66       |
| Revenue                    | 12,872,000 | 11,977,000 |
| Earnings                   | 485,000    | 533,000    |

## TEKTRONIX

| Three Months Ended Aug. 20 |             |            |
|----------------------------|-------------|------------|
|                            | 1977        | 1976       |
| Shr Ernd                   | \$67        | e\$48      |
| Revenue                    | 120,412,000 | 89,543,000 |
| Earnings                   | 11,756,000  | 8,419,000  |

e-Adjusted for a two-for-one stock split peld in May 1977.

## BURROUGHS

| Three Months Ended Sept. 30 |           |           |
|-----------------------------|-----------|-----------|
|                             | 1977      | 1976      |
| Shr Ernd                    | (000)     | (000)     |
| Revenue                     | \$1.06    | \$92      |
| Revenue                     | 490,262   | 443,235   |
| Earnings                    | 43,172    | 37,188    |
| 9 Mo Shr                    | 2.99      | 2.58      |
| Revenue                     | 1,447,688 | 1,312,808 |
| Earnings                    | 121,106   | 103,928   |

## COMDISCO

| Year Ended Sept. 30 |             |            |
|---------------------|-------------|------------|
|                     | 1977        | 1976       |
| Shr Ernd            | \$06        | \$213      |
| Revenue             | 112,807,000 | 84,033,000 |
| Earnings            | 3,180,000   | 2,325,000  |

## AUTOMATION INDUSTRIES

| Three Months Ended Sept. 30 |             |             |
|-----------------------------|-------------|-------------|
|                             | 1977        | 1976        |
| Shr Ernd                    | \$54        | \$27        |
| Revenue                     | 83,083,000  | 58,979,000  |
| Tex Cred                    |             | 248,000     |
| Earnings                    | 2,893,000   | 1,883,000   |
| 9 Mo Shr                    | 1.47        | 1.12        |
| Revenue                     | 185,508,000 | 179,658,000 |
| Earnings                    | e8,362,000  | 7,871,000   |

e-Includes \$1 million gain from resale of certain assets.

## BOOTHIE COURIER

| Three Months Ended Sept. 30 |            |            |
|-----------------------------|------------|------------|
|                             | 1977       | 1976       |
| Shr Ernd                    | \$70       | \$31       |
| Revenue                     | 19,074,000 | 15,095,000 |
| Earnings                    | 2,414,000  | 1,102,000  |
| 9 Mo Shr                    | 1.50       | .77        |
| Revenue                     | 53,614,000 | 41,707,000 |
| Earnings                    | 5,238,000  | 2,852,000  |

## BUNKER RAMO

| Three Months Ended Sept. 30 |             |             |
|-----------------------------|-------------|-------------|
|                             | 1977        | 1976        |
| Shr Ernd                    | \$50        | \$34        |
| Revenue                     | 83,757,000  | 77,203,000  |
| Tex Cred                    |             | 330,000     |
| Earnings                    | 3,148,000   | 2,815,000   |
| 9 Mo Shr                    | 1.19        | .65         |
| Revenue                     | 257,415,000 | 241,767,000 |
| Tex Cred                    |             | 1,880,000   |
| Earnings                    | 7,518,000   | 5,709,000   |

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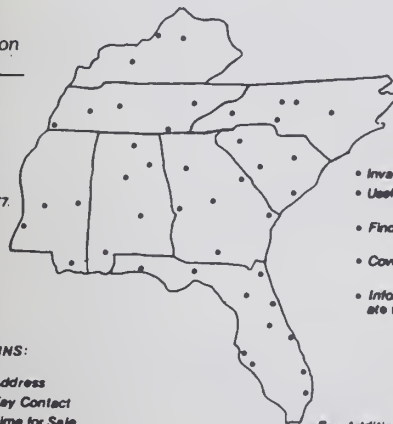
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# From Pertec's View, Tape Mart Not Shrinking

By Esther Surden  
CW Staff

LOS ANGELES — A myth has been circulating in the minicomputer peripheral business that says the tape market is either bottoming out or will only grow about 5% per year, according to Ralph Gabai, vice-president and general manager of Pertec Computer Corp.

It's a myth that is clearly disproved in Pertec's own minicomputer tape drive business, Gabai noted.

That business is growing at from 17% to 20% this year, he said, and the primary reason this market continues to grow is that there is no real alternative to tape for backup. It offers the lowest cost per bit of any medium and is also industry-compatible so that data stored on tape can be transferred to other systems, he noted.

Pertec's tape operation is growing at the super mini end. The first deliveries of the firm's 125 in./sec autoloader tape drive using group code recording (GCR) 6250 technology have been made and the firm is now working on and is "very close to bringing to market" a GCR 6250 tape formatter.

The device has "upwards of 800 chips" used to solve the "two out of nine bit error factor," Gabai noted. It

## Prime Head Sees More Growth

FRAMINGHAM, Mass. — A key question for Prime Computer, Inc. is how fast can it continue to grow, President Kenneth Fisher said recently.

Thus far the firm, a \$50 million manufacturer of general-purpose interactive computer systems, sees nothing in the economy, the competitive scene, its financial situation or its ability to obtain good people that should slow its growth, he told a meeting of the New England Council of the Western Electronics Manufacturers Association (Wema).

Although Fisher acknowledged that obtaining good people is not a trivial problem, Prime's attitude is that it can get the talent it needs. If the firm cannot, it will slow down its development plans, he said.

Currently, the firm is at least doubling its number of employees each year, he added.

Prime is very bullish on the computer industry for 1978, he stated and in the industry, Fisher sees a huge demand growing at least 25%/year for the next five years.

Looking at Prime specifically, he said he sees an infinite, elastic demand with prices rising for software and declining for hardware. The demand will form an overall favorable picture of costs and pricing.

Various factors influencing growth are the marketplace, a firm's product strength and development plans, the competition, plant capacity, employee capability and financial strength, he indicated.

To aid in its planning, Prime has developed a model, Fisher said. So far it has performed 336 different runs, anticipating different changes from a price drop to the impact of various products. Prime is now fine tuning the model — and 1978 looks like a very good year, he said.

will complement the company's high-performance drive so that users can read and write 6250-compatible tapes on drives containing four times the capacity now standard while at the same time paying less in terms of cost per bit, he added.

The disk market is also expanding on the high end of the mini arena, he continued. The firm recently began delivering its "cartridge extension to the D3000 disk line." The product puts two more fixed platters and heads on the disk, doubling the capacity at about a 15% increase in cost. The unit occupies the same space as its predecessor, he added.

The products are expanding the customer base for Pertec, Gabai pointed out. Minis are migrating upward

toward systems that have large data bases on-line, and manufacturers and turnkey vendors are turning to independent disk and tape makers for these large-scale mini systems, he said.

Peripherals in the microcomputer market are also booming, Gabai stated. As the price of the CPU comes down, peripheral prices will appear to be more and more out of line in comparison, he admitted. This is because peripherals are inherently more sensitive to labor and materials.

In the final analysis, end users will not care that the disk or tape drive costs more than the microcomputer that controls the central processing. "The market place is going to want a system solution," Gabai said, and will only care about the total hardware and

software picture.

The company is working on "new technologies" such as charge-coupled devices (CCDs), which are often touted as disk replacements, but Gabai feels the CCDs will not replace disks, because they must also be backed up. CCDs are important to the industry, however, because they will lead to the "first real computer on a chip," he continued. Presently the micro manufacturers are making a processor on a chip, but the advance in CCD technology will expand this to include memory.

Pertec has had a very good year, he added, and it expects to "track the growth in the market" and if it achieves that goal, "will be doing very well indeed."

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## Orders & Installations

### N.Y. Social Services Orders Univac 1100

ALBANY, N.Y. — The New York State Department of Social Services has ordered a Univac 1100/43 system valued at about \$9.6 million to implement new centralized welfare and Medicaid Management information systems.

When completed, the Albany center will be one of the largest computer complexes operated by any state government agency in the U.S.

The first application is scheduled to begin running this fall.

### Other Orders

Houghton Mifflin Publishing Co. of Boston has ordered Computer Automation Syfa minicomputer systems for a distributed processing network that will link branch offices in six U.S. cities. The contract is valued at approximately \$700,000.

American Cynamid and State Accident Insurance Fund have ordered the System 2000 from MRI Systems Corp.

The California State University and Colleges and CLSI have signed an agreement for installation of the Libs 100 circulation control system at the university's Sacramento campus.

The Defense Logistics Agency has installed up to 40% of 200 Harris 8171 terminal systems, up to 800 CRT keyboard/display units and up to 500 Model 3115/88 printers.

New Jersey Educational Computer Network, Inc., Continental Group of Manhattan, and Schmalbach in Germany will install the System 2000 by MRI Systems Corp.

Martin Marietta Aerospace of Orlando, Fla., has taken delivery on a Calma Graphic Data System for design applications in its microelectronics operations.

The Citizen and Southern Corp. (Charlestown, S.C.), the Shawmut Bank (Boston), the South Carolina National Corp. (Columbia, S.C.) and Western Bancorp Data Processing Co. (Los Angeles) have ordered computer-based personnel systems from Information Science, Inc.

Great Western Sugar Co. of Denver has ordered three Series 21 source data entry systems from Mohawk Data Sciences Corp.

Arthur Andersen & Co. has indicated its intent to purchase Reality systems valued at approximately \$2.8 million from Microdata.

Modular Computer Systems of Fort Lauderdale, Fla., has agreed to purchase from Applied Digital Data Systems, Inc. (Addis) 1,000 Addis Regent series CRT terminals valued at approximately \$1 million.

### Correction

In the story headlined "I-8100 Called 'Cornerstone' for NCR" [CW-Oct. 24] the I-8100 was compared with several other vendors' systems including the Burroughs Corp. B-80. Although the B-80 works in batch mode, it is primarily an interactive machine.

## To Be Evaluated

# NBS Gets Comments on I/O Revision Plan

BETHESDA, Md. — The National Bureau of Standards (NBS) has received eight comments on the revised implementation procedures for the proposed channel-level I/O interface standard, according to Thomas Pyke, chief of the Computer Systems Engineering Division of NBS' Institute of Computer Sciences & Technology.

Issuing a standard revision as NBS did this fall with the I/O interface, is "out of the ordinary," Pyke said [CW, Sept. 12].

### Best Possible Standard

NBS' revision represents an effort to make the standard as good as it can be regarding benefits to the federal government, he observed. "We're going

out of our way on a standard as important as this," he added.

NBS has placed a high priority on evaluating the comments it has received during this latest round and expects to have its analysis completed by mid-December, Pyke said.

Pyke intends to prepare individual responses, treating those issues raised both in the spring and fall periods with point-by-point comments, he said.

While it is too early to assess the content of the recent comments, eventually the NBS will compile a comprehensive report on the comments as well as a summary, he said.

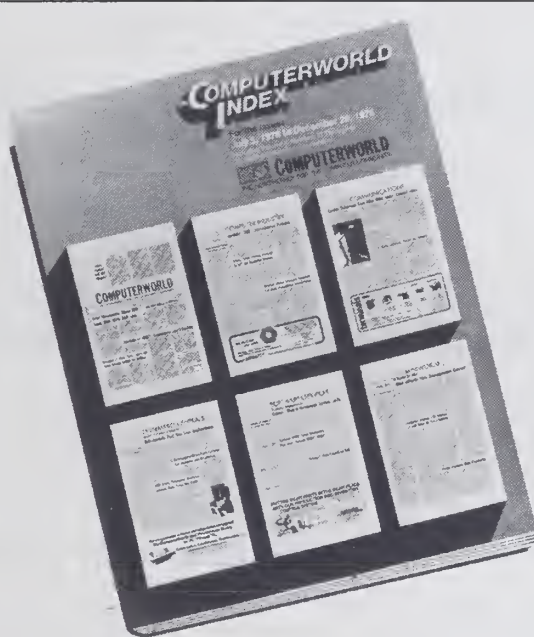
After evaluating the latest round of comments, NBS must determine whether it should propose more revisions

or whether the existing proposal should be submitted to the Department of Commerce for approval by Secretary Juanita Kreps.

NBS will provide Commerce with a package that includes the comments received and NBS' responses, Pyke indicated.

### Respondents Named

The respondents included Honeywell, Control Data Corp., Burroughs, IBM and the Computer and Business Equipment Manufacturers Association (Cbema). The Computer and Communications Industry Association (CCIA), Congressman Jack Brooks and Norman Ream, formerly with NBS, also filed this fall.



The new Computerworld Index, published quarterly and cumulative, is an invaluable reference tool for organizations that have a need-to-know about what's going on in the computer world.

The first issue of the Index for example, covers the last six months of 1976, and it includes more than 4,000 entries by subject, author and name of any company mentioned. It breaks topics down into highly usable and convenient categories:

- There are entries by *product or service*, like *PRINTERS*, which has 37 entries in the six-month period covered; or *LEASING*, which has 10.
- There are entries by *industry*, like *INSURANCE*, under which there are 17 entries for various stories on the use of computers in the insurance industry.
- *Types of computer applications* is another way you can look something up in The Index. The category *INVENTORY SYSTEMS*, for example, has 21 entries.
- *Regulatory, security and social issues* are also indexed. There are 34 entries under *PRIVACY*, 10 under *PRIVACY ACT* and 9 under *PRIVACY PROTECTION COMMISSION*, for example.
- The Index also makes it easy to look into *legal aspects of computer use* with categories like *LITIGATION*, which has 24 entries in the last six months of 1976.
- Even *foreign countries* are indexed. The category *JAPAN*, for example, has 9 entries.
- ... and there are *others*: *KIT COMPUTERS* (the kind you build yourself) are the latest thing, and The Index shows 5 entries. *POINT-OF-SALE SYSTEMS* has 14 entries ... and there's much, much more.

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Application and Assembly language programmers are needed for implementing control, signal processing, and autopilot algorithms.

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Engineers required in all microwave disciplines including antennas, receivers and microwave components.

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Will support evaluation testing of weapon systems and subsystems. Specialized experience in software/hardware design or microwave useful.

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**System Engineers**

Will provide conceptual design definition for a wide variety of systems and subsystems.

**Analysts**

System analysts to work with system engineers in trade-off analysis to support system concept and definition.

**Send your resume in confidence**

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Experienced individual sought to join progressive and innovative computer firm as a Technical Planner for our future hardware needs. Qualified candidate must have experienced monitoring performance of IBM 360 or 370's under O/S, also experience with 158 under VS and IMS-VS preferred. Interested individuals should call collect or write:

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## Computer Science Researchers

# Research us!

Digital's Research and Advanced Development Group is where outstanding professionals in the computer sciences blend research, advanced development, and internal consulting in a stimulating informal atmosphere where the fruits of ideas have visible impact. We're currently seeking professionals with a doctorate or equivalent theoretical background and demonstrated practical achievement in their specialties. Such accomplishments as books authored or patents are plusses.

If you're interested in investigating just how advanced your work could be, we would like to hear from you.

### I/O Architecture Researcher

You will be investigating new I/O architectures and bus structures, particularly those in the areas of intelligent, message-oriented, and microprocessor controlled devices and systems.

### CPU Architecture Researcher

You'll perform research into CPU and computer system organization, and act as a company consultant on matters relating to the design and comparative analysis of new architectures. Research areas to be considered include hard and soft architectures, impact of new technology, design simulations, and evaluation of current designs.

### Memory Hierarchies Researcher

Your principal responsibilities will be to provide insight, data, and tools for the design of hierarchical memory systems. The position involves understanding how and when new technologies affect memory hierarchies, creating various models to assess cost/performance, and developing mechanisms for determining the performance of individual programs and entire systems.

### Researcher in Highly Available Systems

You will be engaged in research and advanced development in the highly available systems, with research directed toward exploring and specifying the software and hardware approaches to increasing the availability of new and existing systems.

### Hardware Design Researcher

You will investigate new design techniques and technologies in computer systems design. Your projects will involve intelligent peripherals, the role of VLSI in future systems, and applications of new technologies to computers. Interaction with product development groups within the company will be an important facet of this position.

### Computer Technology Researcher

This position requires uncovering, following, interpreting and communicating new developments in related technologies that may affect computer systems of the future. Your interest areas should include printer technology, mass storage devices, and video techniques. The ability to maintain effective communications with other areas of the corporation will be necessary.

### Human Factors Researcher

You will be responsible for research and consulting within the corporation on human factors problems associated with all aspects of computer systems, emphasizing the application of existing human factors knowledge. This key position will be the nucleus for present and future human factors activities in the Digital Research and Advanced Development Group. Leadership experience would be a plus.

### Microcomputer-Multiprocessor Researcher

Responsibilities include researching and comparing the available methods for interconnecting small processors to achieve greater performance, reliability, or both. You'll also determine the hardware and software architecture, choose the implementation techniques for construction of prototype systems, and carry out advanced development projects to illustrate results.

### Software Engineering Researcher

Your goal will be to make substantial progress toward simplifying the use of our computers, enabling anyone with an understanding of the application area to use the resulting system for a broad range of laboratory requirements. Major problems to be addressed include determining how the modules should be interconnected, specification of the user interface, and evaluation of costs and benefits of using the modules for applications developments. Knowledge of signal processing and laboratory applications would be a plus.

### Researcher in Natural Language Data Base Systems

You will contribute to the investigation and implementation of a natural language interface to data base systems. This interface should be usable by professionals who have little or no knowledge of programming.

### Software Methodology Researcher

You will participate in the design and implementation of a prototype system for support of software development. This project will utilize the latest software engineering methodology to provide a complete environment for software design and implementation, with a goal of substantially improving software quality and increasing software engineers' productivity.

### Numerical Analysis Consultant

As a consultant for internal customers on questions involving numerical mathematics, your typical assignments would include detailed verification of numerical accuracy of logic and microcode, analysis of the accuracy of mathematical software, and making recommendations for improvements in the accuracy or performance of various products. Applied research on numerical mathematical topics will also be expected.

### Artificial Intelligence Applications Researcher

You will apply current technology in artificial intelligence to develop prototype peripherals that use human-oriented media. Emphasis will be on using this technology to develop practical, cost effective devices for tasks such as optical scanning of printed pages, voice input and voice output.

### Security And Protection Researcher

Your research and consulting in security and protection will concentrate on operating systems. You will develop a security model which can objectively compare different operating systems. The goal is to evaluate the strengths and weaknesses of existing systems, and especially to influence future ones.

These positions are located in our corporate headquarters in Maynard, Massachusetts, approximately 25 miles west of Boston. In Maynard and its surrounding communities you and your family will find excellent school systems, contemporary or colonial homes on large parcels of land, equestrian and hiking trails, camping, and all of the things that make life in New England unique. In addition, we're just minutes away from some of the nation's premier educational, cultural, and recreational resources. In Massachusetts, you'll find what are unquestionably some of the finest lifestyles in the country.

*If you are interested and qualified in the above positions, please forward your resume, indicating position desired to Joe Hart, Digital Equipment Corporation, Dept. B1121 3807, 146 Main Street, Maynard, Massachusetts 01754. We are an equal opportunity employer m/f.*

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You should have a proven track record in minicomputer software development operating systems, file structures and compilers. Depending on your qualifications, you also may be responsible for initial hardware software development of an advanced minicomputer. Tasks involve staffing, product planning and developing a real time operating system and its related modules for a minicomputer system

For more information please forward your detailed resume in complete confidence to this paper, box 3339. We are an affirmative action equal opportunity employer male/female handicapped

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## DATA BASE SUPERVISOR

(ADMINISTRATOR)  
SALARY TO \$24,000

Minimum Qualifications: graduation with major in computer science, data processing or related field. Three years experience in data processing, programming, or systems; one year of which has been in IBM IMS data base design, DLI communications, data base performance monitoring and backup/recovery systems. Two years college acceptable if 5 years experience, but must have the 1 year of IMS DC experience as stated above.

Successful candidate will control all data base activities at County computer center and will directly supervise the activities of two systems programmers. Excellent benefits in beautiful Southern California. Telephone immediately for application.

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Growing six state, seven office law firm with midwestern headquarters looking for an imaginative person with substantial experience in research and computers. Race, creed, color, sex, age, handicap of no consequence if you have a good mind and creative attitude. A real chance to grow and make money! Send resume to CW 3227, 797 Washington St., Newton, Mass. 02160.

## DATA PROCESSING DIRECTOR

Data Processing Director for non-profit cooperative center to serve local jurisdictions near rural North Carolina coast. Superior communication, human relation and organizational talents required. Min. 3 years exp. as DP director, preferably in local gov. Help select hardware, software and staff. \$21-24000. Send resume to WD Heath, Box 5125, NC State Univ., Raleigh, N.C. 27607.

## DIRECTOR SYSTEMS MANAGEMENT

We have an immediate opening for exceptional individual to assume responsibility for the Systems Management Department in a 620-bed, acute care hospital. Involves planning, designing and updating of existing business and clinical computer systems. The successful candidate must have management experience in a data processing environment, proven technical competence and the ability to communicate effectively with administrative and medical personnel. Hospital and management engineering experience and a college degree are desirable but not required. Please send resume including salary history in confidence to:

Darrell M. Walters  
Employment Manager  
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DataPhase Systems, Inc., a rapidly-growing leader in interactive database applications, has several challenging positions on its software staff. Responsibilities include system development and implementation, field support, and interfacing with vendors and customers. Limited travel. We are looking for two year's active experience in programming, preferably with MUMPS or MIJS, and familiarity with minicomputer systems. Good communication skills required. This is a permanent professional position.

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Mr. Lloyd F. Botway  
Manager, Systems and Development  
DataPhase Systems, Inc.  
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Kansas City, Missouri 64111  
(816) 931-7927

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Lockheed Electronics Company at the Johnson Space Center in Houston, Texas is seeking individuals who will be responsible for the analysis, design and development of financial accounting and control systems in a large-scale on-line data base environment. Candidates should have two to five years experience in the following areas:

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- DBMS
- DATA BASE DESIGN
- COBOL PROGRAMMING

Positions require a bachelor's degree in accounting or computer science, or the equivalent. Send resume in confidence to Bill Jancha, Dept. A-10-62, Lockheed Electronics Company, Inc., 16811 El Camino Real, Houston, Texas 77058.

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Our aggressive growth oriented Sunbelt Client seeks a people oriented Corporate Management Informations Systems Director who has the ability and desire to be a top executive.

Ideal candidate will have first-hand systems knowledge from a manufacturing environment plus the ability to interface with Corporate Officers while directing operations, systems, programming and long-range planning.

Please discreetly call or rush a confidential resume to the EDP MANAGEMENT SPECIALIST at:

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**R.P.I.**

Rensselaer Polytechnic Institute in beautiful upstate New York is building a new computing center and installing an IBM 3033 to support a large network of timesharing terminals and distributed micro and minicomputers. Talented individuals are being sought for the following positions in order to help design, develop, and support this major new academic computing center; salary open depending on experience.

### Training and User Support

Responsible for planning and coordinating short courses and lectures, and assisting with consulting for students, faculty, researchers, and off-campus users. Familiarity with several languages required, teaching or academic experience desirable.

### Computer Language Specialist

Installs and maintains all compilers; provides enhancements and assists with consulting. Broad knowledge of computing languages presumed, preferably on IBM systems.

### Timesharing Support Specialist

Responsible for enhancing the Interactive and productivity characteristics of a 200-terminal environment. Intended primarily for program development. Systems programming experience required.

### Hardware and Communications Engineer

Advise management on the acquisition and support of new equipment; designs and implements specialized communications, data acquisition, and related computer hardware. Microprocessor and programming experience desirable.

### Systems Design Specialist

Responsible for designing and implementing major structural changes to fundamental parts of the operating system in such areas as CPU scheduling, memory management, and I/O device support. Requires prior design experience in operating systems.

### Systems Support Specialist

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### Systems Programmer

Responsibility includes the development and modification of PRIME 500 systems software to support 36 refresh graphic terminals. Unusual opportunity to provide major technical input into a developing educational project. Requires knowledge of the PRIME system.

RPI is an Equal Opportunity/Affirmative Action Employer. Send resume, 3 professional references and salary requirements to: Manager of Recruitment, Personnel Department, Rensselaer Polytechnic Institute, Troy, NY 12181.

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### FOR INDIVIDUALS WHO STAND OUT

The fast-paced systems operation of the General Electric Supply Company, a major distributor of electrical supplies and apparatus, has openings for:

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Responsibilities include definition and resolution of business problems. Requirements are good project management skills, ability to communicate effectively with management, and a minimum of 5 years DP experience, including 2 years as a Programmer/Analyst.

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We offer excellent salary and benefit packages. For prompt consideration, please forward your resume to:



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## DATA PROCESSING

### DATA PROCESSING MANAGER

Excellent opportunity for capable individual to serve as data processing manager.

We are a progressive 245 bed expanding community hospital located in historic Annapolis.

We are looking for an exemplary individual who has a minimum of 3 to 5 years DP experience. BS degree in related fields preferred. Prior hospital/large institution experience a plus. Some experience in NCR also a plus.

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You will perform and/or conduct system evaluation related to performance characteristics of computer based Point-of-Sale systems and subsystem elements (terminals, computers, peripherals, etc.) Candidates must be familiar with micro and mini computer systems hardware and they should bring two or more years experience including exposure to isolating and solving problems related to RFI-EMI.

## LOGIC DESIGN ENGINEER

To perform logic and circuit design for the (OCR) Optical Character Recognition equipment used in Retail Point-of-Sale (P.O.S.) applications.

The work involves design and analysis of pattern recognition techniques and their implementation using TTL and/or micro-processor type devices.

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To perform hardware design and some systems work on a next generation hospitality terminal including communications from the terminal to the CPU and peripherals. Some microprocessor architecture knowledge would be helpful.

A degree plus 2 or more years design experience will qualify.

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## ASSISTANT DIRECTOR FOR SYSTEMS

The University of Maryland Computer Science Center at the College Park Campus is seeking to fill the position of Assistant Director for Systems. The Computer Science Center serves as the central facility of the University's Instructional and Research Network and is responsible for servicing the computational needs of the students and faculty on all campuses in pursuing their educational and research goals. The Systems staff supporting these activities consists of 14 systems analysts.

Applicants must have a broad background in computer languages, computer architecture, networks and distributed systems, communications, operating systems and data base systems. Substantial systems programming experience on large-scale time sharing operating systems is required. Particular expertise with internals of language processors, I/O handlers, job and resource and evaluation techniques is highly desirable. Experience with UNIVAC 1100 operating systems, software and hardware would be most helpful.

Responsibilities as Assistant Director of the Center include active participation in planning, evaluating and responding to proposals for updating computer facilities within the Center and elsewhere in the University; modifying master plans for educational computing; and providing management information and advice with respect to computer acquisitions for use by various units of the University. The position requires a capacity for leadership and management of the tasks of system maintenance, installation, trouble shooting, performance measurement, and software design and development. The ability to communicate verbally and in writing is essential.

Education: Master's Degree required (a doctorate in computer science or a related field is preferred).

Salary competitive.

Send resume (with salary requirements) to:

Director  
Computer Science Center  
University of Maryland  
College Park, Maryland 20742

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Send resume to:

Dr. Wallace E. Killcreas  
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Mississippi State University  
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## Sycor is leading the way in Distributed Data Processing Technology

SYCOR, Incorporated, a leader in the manufacture of distributed data processing systems, is currently seeking qualified

### SENIOR ELECTRONICS ENGINEER

BSEE with minimum 4 to 6 years' experience or equivalent in development of hardware systems using micro computers on discrete controllers. Experience in areas such as disc controllers or other mass storage system controllers is preferable.

### SENIOR DESIGN ENGINEER - FIRMWARE

BSEE or BS in Computer Science with 2 to 3 years' experience in software development of real time mini-micro computer systems. Experience with I/O drivers for devices such as cassettes, magnetic tapes, floppy disks or disks is preferable.

### FIRMWARE ENGINEER - DIAGNOSTICS

Minimum 2 years' experience in hardware design, programming in assembly language of micro computers. Diagnostics programming a definite plus. BSEE or equivalent desired.

### SENIOR ENGINEER - ANALOG

Requirements include BSEE degree with MSEE desired and seven years experience in either CRT display systems or data communication circuit design. CRT display systems experience must include knowledge of analog electronics, deflection components, flyback HV generation, and CRT characteristics. Data communication circuit design experience must include knowledge of analog/digital techniques for transmitting data over long cables.

### SENIOR MECHANICAL ENGINEER

A BSME is required, MSME highly desirable, plus at least 7 years' experience in the design of products involving small, high reliability mechanisms, preferably in the printed field or related to computer peripherals. Your background should include leadership responsibility on development projects.

### INDUSTRIAL ENGINEER

Minimum 2 years' experience with printed circuit board assembly methods a must. electro-mechanical assembly experience a definite plus, should be experienced in processing and standards. A degree in E.E. or equivalent experience is needed.

### USER LANGUAGE DEVELOPMENT

Participate in the development of COBOL/BASIC/RPG II Compilers and associated interpreters for Sycor 400 Series equipment. Responsibilities include language development, design and implementation. BS or MS in Computer Science or related field with relevant course work and/or experience. Knowledge of block structured language and one of COBOL/BASIC/RPG 11. Machine level programming, especially 8080 or other microprocessor would be a plus.

### SYSTEMS LANGUAGE DEVELOPMENT

Participate in development of Sycor systems implementation language, SYCLOPS. Responsibilities include language development, compiler development, code generation for new microprocessors and application of source optimization techniques. BS or MS in computer science or related field with relevant course work and/or experience. Knowledge of block structured language and machine level programming, preferably for 8080 or other microprocessor is a plus.

### DBMS DEVELOPMENT

Participate in the development of a generalized DBMS for Sycor systems using state of the art technique. BS or MS in computer Science or related field with emphasis on data structures and DBMS. Knowledge of a block structured language and machine level programming, preferably for 8080 or other microprocessor is a plus.

### TECHNICAL WRITERS

Strong background in digital logic and minimum 1 year experience in writing about digital logic and computer related modules required. BSEE or equivalent necessary. You will research and write technical manuals used by our field service personnel when performing maintenance of Sycor terminals. Bachelor's degree desired.

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## COMPUTER PROGRAMMER II

(Computer Center)  
2 positions. Pay Grade 19, \$888/monthly. Minimum qualifications: High school graduation and two years of experience as a programming technician or high school graduation and two years of vocational training in data processing or any combination of University education and vocational training in data processing consisting of no less than one year of each. Duties and responsibilities: Under direct supervision from a designated supervisor, to assist in the review and analysis of detailed computer systems and in the preparation of the program instructions; and to participate in the preparation of block diagrams, machine logic flow charts, and test data. Application deadline: December 3, 1977. Apply directly to: Office of Personnel, Marshall University, Huntington, W. Virginia 25701. An Equal Opportunity Employer.

## SYSTEMS ANALYST II

(Computer Center)  
Pay Grade 25, \$1,190/monthly. Minimum qualifications: Adequate knowledge of data processing practices, methods, principles and techniques relative to the application and operation of computers; ability to conceive, modify, plan, and develop electronic data processing systems for a computer complex for both the existing applications as well as for new areas of application; ability to communicate, express, understand, and develop ideas; ability to converse fluently in non-technical terms and to present electronic data processing equipment applications to users; high school graduation and five years of data processing experience including at least three years programming and one year in systems development or any combination of university training and data processing experience totaling five years and consisting of no less than three years programming and one year in systems development. Duties and responsibilities: Under administrative supervision, to be responsible for planning and coordinating systems analysis, analyzing problems for electronic or other data processing solutions, determining methods of use of data processing equipment, and implementing and maintaining computer base data processing systems. Application deadline: December 3, 1977. Apply directly to: Office of Personnel, Marshall University, Huntington, W. Virginia 25701. An Equal Opportunity Employer.

## PROGRAMMER/ANALYST

Leading manufacturer of distribution transformers seeks a responsible, aggressive professional to join in the development of manufacturing systems. Rapid growth requires staff expansion and offers challenging and rewarding opportunity for the successful applicant. Qualifications should include a B.S. degree in Computer Science or related field, at least three (3) years COBOL programming experience, working knowledge of IBM S/370 and DOS/VS, and experience in the development of manufacturing systems such as Inventory Control, Work In-Process, Labor Costing and MRP. Knowledge of CICS and DL/I also desirable. Starting salary commensurate with experience, education and ability. Excellent fringe benefit package. Contact in confidence:

W.R. Austin, Div. Mgr.-Personnel & Community Relations, Central Moloney, Transformer Division, P.O. Box 6608, Pine Bluff, AR 71601.

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Must have Assembly language programming experience. Will have project responsibility in Operating Systems & Integration of I/O drivers. Some systems analysis and design experience preferred. If selected you'll be working with distributed processing, program down loading, fail over and device diagnostics.

## ENGINEER (MARKETING SUPPORT)

Exp. in logic & systems design. Knowledge of computer peripherals required. Applicants with background or strong interest in marketing preferred.

## PROJECT ENGINEERS PROJECT MANAGERS

Cost proposals, systems design, systems configurations contract negotiations, customer liason, project schedules & budgets, installation and field support. BSEE preferred with some software background. For project manager, you should have 5 or more years relevant experience.

## PROGRAMMERS

Programming through software development & project implementation experience in any of the following: computer based monitor and control disciplines, data acquisitions, process variables (multiplexing), man-machine interface; intra CPU communications; display compilers; data base generation; monitor & control modules, I/O handlers; computer to computer communications; real-time language processing software.

SYSTEMS offers top starting salaries, relocation to beautiful Fort Lauderdale, Florida, a full-range benefits program including dental insurance, savings/retirement plan and 100% tuition refund, and the opportunity to work and advance your career in a stable and stimulating professional environment. For immediate and confidential consideration, please forward resume or detailed letter of information, including current annual compensation to

Mr. Frederick J. Brillante, Dept. 1121CW

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Engineering Laboratories

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Link your career to the unprecedented growth of ADR's Software Products Division. Participate in marketing and supporting the most extensive software product line in the industry. We are interested in dedicated professionals who are capable of calling on and servicing the best known companies in the country, our clients.

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Some Facts About ADR...founded in 1959...development personnel average well over 8 years with company...field and sales personnel over 5 years...stable (Over \$15' million last year)...traded on American Stock Exchange...employs over 300 people...small enough for personal recognition...nation's oldest independent software company...representatives throughout the world...software product line diverse, versatile, state-of-the-art...excellent employee benefits.

Please send resume with full details including current salary and position desired in complete confidence to:

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APPLIED DATA RESEARCH, INC.

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## WASHINGTON UNIVERSITY

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We are looking for an energetic, imaginative individual to take responsibility for Academic User Services, Computer Operations, and other specialized computer resources including a mini-computer service center and a special projects programming staff. The position is a part of the senior management team of the Computing Facilities, the University academic and administrative computer service facility.

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Current experience in a large IBM mainframe and multi-vendor environment is preferred. Management, motivation and delegative skills will be the essential candidate criteria. All inquiries will be considered in absolute confidence.

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(206) 455-9800  
1621-114th S.E., Suite 219  
Bellevue, WA 98004

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**Denver**  
**Colorado Area**

IBM 370/148, DOS/VS, CICS, ADABAS environment.

Requires minimum of two years specific experience in analysis, implementation and testing of operating systems, data communications monitors, data base management systems, compilers and system support software plus two years in general programming. College degree or equivalent work experience. Proficient in ALC plus working knowledge of COBOL or PL/I. Experience with VM/370 and OS/VS1 desirable. Please send current resume to:

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Jefferson County  
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Golden, Colorado 80401  
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## FACULTY POSITION

Full-time (9 months) faculty position in management information systems and data processing in the School of Business and Administrative Sciences. Candidates must have related doctorate and post-doctorate teaching experiences in a college of business, should possess a sound knowledge of management information systems, including systems analysis and design, data base, programming languages, and business applications software, as well as general competence in quantitative management science. Teaching will be at the BBA and MBA levels and individual will be responsible for coordinating curricula in data processing/MIS. Salary and rank commensurate with experience. Proposed starting date: August 1978 or January 1979. Send resume with references to: Professor William S. Peters, Anderson School of Business and Administrative Sciences, University of New Mexico, Albuquerque, NM 87131. An Equal Opportunity/Affirmative Action Employer.

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Successful candidate will have a minimum of 1-2 years of FORTRAN programming experience, preferably on Honeywell 6000. Mini-computer programming experience is a plus.

We offer a competitive salary and benefits package and the opportunity for professional advancement with a dynamic, growing company.

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Coordinator of Computer Services to establish and organize computer center. Bachelors in computer science area or equivalent, experience with computer systems, programming. Initial employment salary range \$14,553 through \$18,753. Applications accepted through November 30, call or write Paul Peck 713-763-6551 ext. 288, Galveston College, 4015 Ave. Q, Galveston, Texas 77550. EOE.

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Send resume to: Dr. Wallace E. Killcreas Div. of Numerical Services Mississippi State University P.O. Drawer CC Mississippi State, MS 39762  
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## TEXAS

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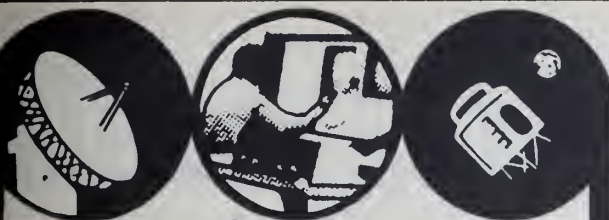
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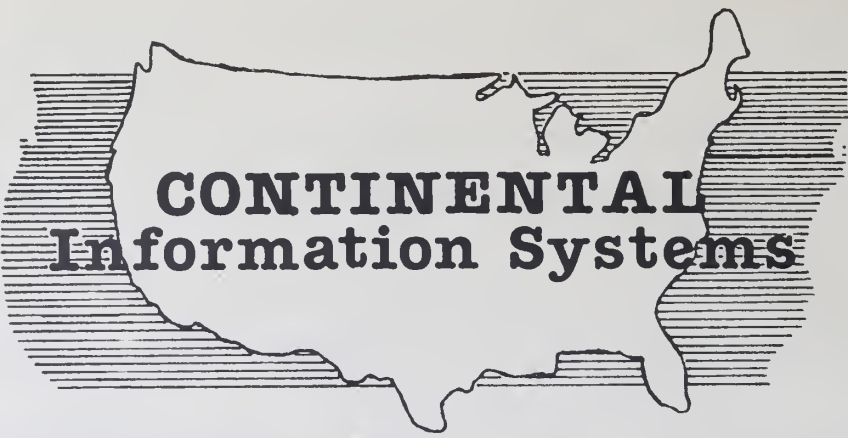
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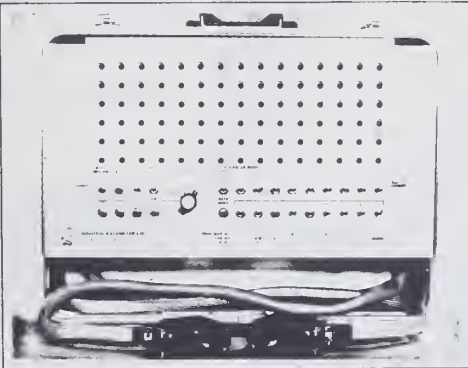


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The EDP Committee of the California Public Contract Project Study Panel will meet to consider the State contracting policies, procedures, laws and contract provisions applicable to electronic data processing leases, purchases and consultant agreements. The meeting will be held at 3580 Wilshire Blvd., Room 870, on December 2, 1977 at 9:30 a.m. Participation, either oral or written, by interested persons is encouraged to ensure that potential or actual problems and potential solutions can be considered by the Committee.

A meeting of the full Study Panel on December 5 at the same location will consider this and other subjects relating to State contracting including socio-economic policies, and termination, delays and liquidated damages.

Interested persons may secure copies of the discussion papers by writing the Project Office at 915 Capitol Mall, Room 538, Sacramento, 95814, or by calling (916) 322-5184.

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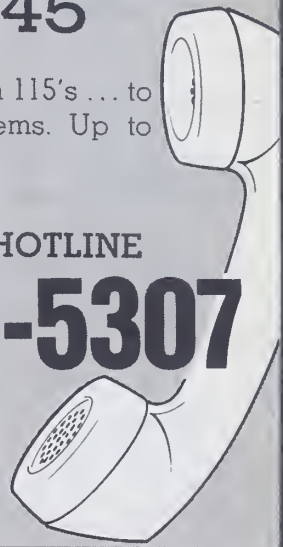
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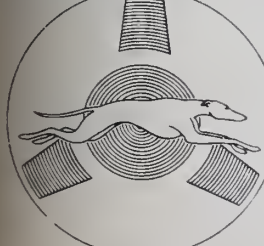
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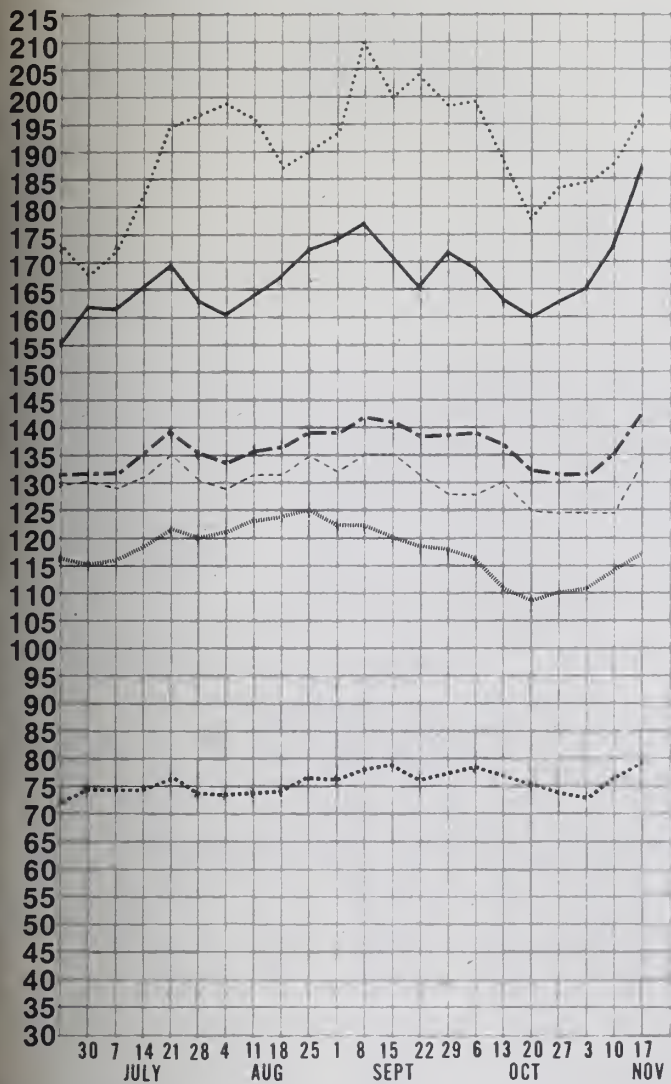
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COMPUTERWORLD  
Computer Stocks Trading Indexes— Computer Systems — Software & EDP Services  
- - - Peripherals & Subsystems ..... Leasing Companies  
..... Supplies & Accessories — CW Composite IndexEarnings  
ReportsCONTROL DATA  
Three Months Ended Sept. 30

|           | 1977<br>(000) | 1976<br>(000) |
|-----------|---------------|---------------|
| Shr Ernd  | \$ .93        | \$ .87        |
| Revenue   | 372,506       | 329,084       |
| Spec Cred | 400           | 350           |
| Earnings  | 15,992        | 14,997        |
| 9 Mo Shr  | 2.45          | 2.12          |
| Revenue   | 1,080,532     | 970,782       |
| Spec Cred | 700           | 600           |
| Earnings  | 42,286        | 36,684        |

DATA GENERAL  
Year Ended Sept. 24

|          | 1977        | a1976       |
|----------|-------------|-------------|
| Shr Ernd | \$2.8       | \$2.11      |
| Revenue  | 254,687,000 | 178,753,000 |
| Earnings | 28,579,000  | 20,780,000  |
| 3 Mo Shr | .99         | .76         |
| Revenue  | 87,544,000  | 63,543,000  |
| Earnings | 9,868,000   | 7,463,000   |

a-Restated to include Digital Computer Controls, Inc., acquired on pooling-of-interests basis.

DATAPRODUCTS  
Three Months Ended Sept. 24

|          | 1977       | 1976       |
|----------|------------|------------|
| Shr Ernd | \$ .50     | \$ .36     |
| Revenue  | 31,819,000 | 28,181,000 |
| Earnings | 3,797,000  | 2,654,000  |
| 6 Mo Shr | .94        | .83        |
| Revenue  | 61,830,000 | 54,881,000 |
| Earnings | 7,116,000  | 4,622,000  |

a-Includes \$1,118,000 gain on sale of building.

DOCUTEL  
Three Months Ended Sept. 30

|          | 1977        | 1976       |
|----------|-------------|------------|
| Shr Ernd | .....       | \$ .20     |
| Revenue  | \$7,815,000 | 8,267,000  |
| Tax Cred | .....       | 254,000    |
| Earnings | (356,000)   | 511,000    |
| 9 Mo Shr | .....       | .70        |
| Revenue  | 21,471,000  | 24,937,000 |
| Tax Cred | .....       | 898,000    |
| Earnings | (561,000)   | 1,811,000  |

COMPUTER PRODUCTS  
Three Months Ended Sept. 30

|          | 1977      | 1976      |
|----------|-----------|-----------|
| Shr Ernd | \$ .17    | \$ .08    |
| Revenue  | 2,401,732 | 1,522,430 |
| Earnings | 246,640   | 118,200   |
| 9 Mo Shr | .42       | .25       |
| Revenue  | 6,406,596 | 4,318,723 |
| Earnings | 605,870   | 361,474   |

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## Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, NOVEMBER 16, 1977

All statistics compiled,  
computed and formatted  
by  
TRADE QUOTES, INC.  
Cambridge, Mass. 02139

|                        | 1977<br>RANGE<br>(1) | CLOSE<br>NOV 16<br>1977 | WEEK<br>NET<br>CHNGE | WEEK<br>PCT<br>CHNGE |
|------------------------|----------------------|-------------------------|----------------------|----------------------|
| COMPUTER SYSTEMS       |                      |                         |                      |                      |
| D AMDAHL CORP          | 22-44                | 42 1/4                  | 0                    | 0.0                  |
| N BURROUGHS CORP       | 55-91                | 68 7/8                  | +3 1/2               | +5.3                 |
| O COMPUTER AUTOMATION  | 18-30                | 26 3/8                  | +1 3/4               | +7.1                 |
| N CONTROL DATA CORP    | 20-26                | 25                      | +4                   | +19.0                |
| O CRAY RESEARCH INC    | 15-29                | 25                      | +1/2                 | +2.0                 |
| N DATA GENERAL CORP    | 35-52                | 51 3/4                  | +3 3/4               | +7.8                 |
| N DATAPoint CORP       | 18-37                | 36 5/8                  | +2 3/8               | +6.9                 |
| N DIGITAL EQUIPMENT    | 37-53                | 48                      | +2 3/4               | +6.0                 |
| N ELECTRONIC ASSOC.    | 2-3                  | 2 3/8                   | +1/4                 | +11.7                |
| A ELECTRONIC ENGINEER. | 8-12                 | 11 5/8                  | +2                   | +20.7                |
| O FOUR-PHASE SYSTEMS   | 13-19                | 19 3/8                  | +1                   | +5.4                 |
| N FDXBORD              | 41-54                | 43 3/4                  | +1 5/8               | +3.8                 |
| D GENERAL AUTOMATION   | 6-9                  | 7                       | +3/4                 | +12.0                |
| O GRI COMPUTER CORP    | 1-1                  | 3/4                     | +1/8                 | +20.0                |
| N HEWLETT-PACKARD CO   | 69-87                | 75 1/2                  | +3 1/4               | +4.4                 |
| N HONEYWELL INC        | 43-55                | 49 3/4                  | +4                   | +8.7                 |
| N IBM                  | 245-286              | 257 7/8                 | +5 1/8               | +2.0                 |
| O MANAGEMENT ASSIST    | 5-9                  | 8 5/8                   | 0                    | 0.0                  |
| O MICRODATA CORP       | 7-18                 | 11 1/2                  | +3/8                 | +3.3                 |
| D MODULAR COMPUTER SYS | 5-9                  | 9 1/8                   | +1 1/2               | +19.6                |

|                      |       |        |        |       |
|----------------------|-------|--------|--------|-------|
| N NCR                | 32-47 | 43 5/8 | +2 1/4 | +5.4  |
| D PRIME COMPUTER INC | 12-23 | 20 7/8 | +1 1/4 | +6.3  |
| N PERKIN-ELMER       | 17-22 | 20 1/4 | +1     | +5.1  |
| N RAYTHEON CO        | 16-33 | 32 7/8 | +2 1/2 | +8.2  |
| N SPERRY RAND        | 30-42 | 34 7/8 | +1 1/4 | +3.7  |
| D SYCOR INC          | 8-15  | 15     | +1/4   | +1.6  |
| A SYSTEMS ENG. LABS  | 5-8   | 8 3/8  | +1 3/8 | +19.6 |
| A WANG LABS.         | 10-14 | 12 5/8 | +1 1/2 | +13.4 |

|                         |       |        |        |       |
|-------------------------|-------|--------|--------|-------|
| LEASING COMPANIES       |       |        |        |       |
| D ALANTHUS CORP         | 3-5   | 4 1/2  | +1/8   | +2.8  |
| O BOOTH COURIER CORP    | 8-10  | 11 5/8 | +1     | +9.4  |
| O COMDISCO INC          | 10-14 | 13 1/2 | +2 5/8 | +24.1 |
| A COMMERCE GROUP CORP   | 1-3   | 3/4    | 0      | 0.0   |
| A COMPUTER INVS TRS GRP | 1-2   | 1      | 0      | 0.0   |
| M DATRONIC RENTAL       | 0-2   | 1 1/8  | 0      | 0.0   |
| A DCL INC               | 1-2   | 2 1/8  | 0      | 0.0   |
| N OPF INC               | 6-9   | 9 1/8  | +1     | +12.3 |
| N ITIL                  | 13-22 | 20     | +1 5/8 | +8.8  |
| N LEASCO CORP           | 19-27 | 25 3/8 | +1/4   | +0.9  |
| O LEASPCOR CORP         | 1-2   | 1      | 0      | 0.0   |
| D NRG INC               | 1-1   | 1 1/8  | 0      | 0.0   |
| A PIONEER TEX CORP      | 5-11  | 5 3/4  | 0      | 0.0   |
| N U.S. LEASING          | 10-15 | 15     | +1 1/8 | +8.1  |

|                         | 1977<br>RANGE<br>(1) | CLOSE<br>NOV 16<br>1977 | WEEK<br>NET<br>CHNGE | WEEK<br>PCT<br>CHNGE |
|-------------------------|----------------------|-------------------------|----------------------|----------------------|
| SOFTWARE & EDP SERVICES |                      |                         |                      |                      |
| D ADVANCED COMP TECH    | 0-2                  | 3/4                     | +1/4                 | +50.0                |
| D ANACOMP INC           | 7-10                 | 8 3/4                   | 0                    | 0.0                  |
| A APPLIED DATA RES.     | 5-10                 | 7 3/4                   | +1/2                 | +6.8                 |
| N AUTOMATIC DATA PROC   | 23-30                | 28 1/2                  | +1 7/8               | +7.0                 |
| O COLEMAN AMERICAN COS  | 2-2                  | 1 7/8                   | 0                    | 0.0                  |
| O COMPU-SERV NETWORK    | 9-15                 | 12 1/4                  | +1 1/2               | +13.9                |
| D COMP ELECTION SYSTEMS | 6-10                 | 9 1/2                   | 0                    | 0.0                  |
| O COMPUTER HORIZONS     | 1-1                  | 1 1/4                   | 0                    | 0.0                  |
| O COMPUTER NETWORK      | 6-11                 | 10                      | -1/8                 | -1.2                 |
| N COMPUTER SCIENCES     | 7-9                  | 8 1/4                   | +1/8                 | +1.5                 |
| O COMPUTER TASK GROUP   | 1-2                  | 1 7/8                   | 0                    | 0.0                  |
| O COMPUTER USAGE        | 1-3                  | 1 5/8                   | +1/4                 | +18.1                |
| O COMSHARE              | 5-8                  | 7 1/2                   | +1/2                 | +7.1                 |
| D DATA DIMENSIONS INC   | 3-5                  | 3 7/8                   | 0                    | 0.0                  |
| D DATATAB               | 1-2                  | 1 1/8                   | -1/8                 | -10.0                |
| N ELECTRONIC DATA SYS.  | 14-20                | 16 1/8                  | +1/2                 | +3.1                 |
| O INSYTE CORP           | 2-3                  | 1 3/8                   | +1/8                 | +10.0                |
| O IPS COMPUTER MARKET.  | 1-2                  | 2                       | 0                    | 0.0                  |
| D KEANE ASSOCIATES      | 3-4                  | 3 7/8                   | 0                    | 0.0                  |
| D KEYDATA CORP          | 1-3                  | 1 3/8                   | 0                    | 0.0                  |

|                        |       |        |        |       |
|------------------------|-------|--------|--------|-------|
| A LOGICON              | 7-17  | 13 3/4 | +2 1/8 | +18.2 |
| A MANAGEMENT DATA      | 1-2   | 1 1/8  | 0      | 0.0   |
| A NATIONAL CSS INC     | 10-14 | 14 7/8 | +3/8   | +2.5  |
| O NATIONAL DATA CORP   | 4-7   | 6 7/8  | +3/4   | +12.2 |
| A ON LINE SYSTEMS INC  | 16-22 | 18 3/4 | +1 3/4 | +10.2 |
| N PLANNING RESEARCH    | 3-6   | 4 1/4  | +1/4   | +6.2  |
| O PROGRAMMING & SYS    | 1-1   | 3/8    | +1/8   | +50.0 |
| O RAPIDATA INC         | 2-3   | 2 1/2  | 0      | 0.0   |
| O REYNOLDS & REYNOLD   | 17-20 | 18 3/4 | +3/4   | +4.1  |
| O SCIENTIFIC COMPUTERS | 1-4   | 4      | +1/2   | +14.2 |
| O TYMSHARE INC         | 14-23 | 22 7/8 | +3 1/4 | +16.5 |
| A URS SYSTEMS          | 4-5   | 4 5/8  | -1/8   | -2.6  |
| N WYLY CORP            | 1-2   | 3/4    | +      | +8.3  |

|                          |       |        |        |       |
|--------------------------|-------|--------|--------|-------|
| PERIPHERALS & SUBSYSTEMS |       |        |        |       |
| N ADDRESSOGRAPH-MULT     | 10-15 | 14 3/4 | +1 1/2 | +11.3 |
| D ADVANCED MEMORY SYS    | 7-9   | 8      | +1 1/4 | +18.5 |
| N AMPEX CORP             | 8-11  | 9 3/4  | +5/8   | +6.8  |
| D ANDERSON JACOBSON      | 3-5   | 4 5/8  | +3/8   | +8.8  |
| N APPLIED DIG DATA SYS   | 10-20 | 14 1/8 | +5/8   | +4.6  |
| D BEEHIVE INT'L          | 5-12  | 6 1/2  | +1 3/8 | +26.8 |
| A BOLT, BERANEK & NEW    | 7-9   | 7 1/2  | +1/4   | +3.4  |
| N BUNKER-RAND            | 8-12  | 11 7/8 | +1 5/8 | +15.8 |
| A CALCOMP                | 3-5   | 2 3/4  | 0      | 0.0   |
| O CAMBRIDGE MEMORIES     | 1-4   | 2 3/4  | -1/8   | -6.2  |
| N CENTRONICS DATA COMP   | 20-30 | 21 5/8 | +1 3/8 | +6.7  |
| O COGNITRONICS           | 1-1   | 7/8    | +1/8   | +16.6 |
| O COMPUTER COMMUN.       | 5-8   | 6 1/2  | +1/4   | +4.0  |
| O COMPUTER CONSOLES      | 4-7   | 4      | 0      | 0.0   |
| A COMPUTER EQUIPMENT     | 2-3   | 3 1/8  | +1/8   | +4.1  |
| O COMPUTER TRANSCIVER    | 1-1   | 1 1/8  | 0      | 0.0   |
| O COMTEN                 | 9-13  | 10 3/8 | +5/8   | +6.4  |
| N CONRAC CORP            | 19-28 | 21 7/8 | +1 1/4 | +6.0  |

|                        | 1977<br>RANGE<br>(1) | CLOSE<br>NOV 16<br>1977 | WEEK<br>NET<br>CHNGE | WEEK<br>PCT<br>CHNGE |
|------------------------|----------------------|-------------------------|----------------------|----------------------|
| SUPPLIES & ACCESSORIES |                      |                         |                      |                      |
| O DATA ACCESS SYSTEMS  | 4-5                  | 3                       | 0                    | 0.0                  |
| O DATA 100             | 6-9                  | 8 7/8                   | +1/4                 | +2.8                 |
| A DATA PRODUCTS CORP   | 9-17                 | 17 1/8                  | +5/8                 | +3.7                 |
| O DATA TECHNOLOGY      | 3-4                  | 4 1/4                   | 0                    | 0.0                  |
| O DATUM INC            | 1-2                  | 2                       | +3/8                 | +23.0                |
| O DECISION DATA COMPUT | 2-3                  | 2                       | +1/8                 | +6.6                 |
| O DELTA DATA SYSTEMS   | 1-1                  | 3/8                     | 0                    | 0.0                  |
| A DOCUMENTATION INC    | 6-9                  | 9                       | -1/4                 | -2.7                 |
| O DATARAM CORP         | 2-12                 | 11                      | -1/2                 | -4.3                 |
| N ELECTRONIC M & M     | 4-5                  | 4                       | +1/2                 | +14.2                |
| O FABRI-TEK            | 1-2                  | 1 1/8                   | 0                    | 0.0                  |
| D GENERAL COMPUTER SYS | 0-2                  | 1 1/8                   | +1/8                 | +12.5                |
| N HAZELTINE CORP       | 8-12                 | 10 3/8                  | +3/4                 | +7.7                 |
| N HARRIS CORP          | 28-44                | 41 3/4                  | -1/8                 | -0.2                 |
| A INCDTERM CORP        | 10-19                | 18 7/8                  | +1 3/8               | +7.8                 |
| O INFOREX INC          | 4-7                  | 5 1/4                   | +1/8                 | +2.4                 |
| O INFORMATION INTL INC | 9-14                 | 9 1/4                   | 0                    | 0.0                  |
| D INTEL CORP           | 38-57                | 46                      | +1                   | +2.2                 |
| A LUNDY ELECTRONICS    | 3-6                  | 3 7/8                   | -1/4                 | -6.0                 |

|                      |       |        |        |       |
|----------------------|-------|--------|--------|-------|
| D MSI DATA CORP      | 6-13  | 13 3/8 | +1 1/8 | +9.1  |
| O MEMOREX            | 23-34 | 29 3/4 | +3 1/4 | +12.2 |
| N MOHAWK DATA SCI    | 5-8   | 5 7/8  | -1/8   | -2.0  |
| O PENRIL CORP        | 2-5   | 5 1/8  | +1/4   | +5.1  |
| N PERTEC CORP        | 7-10  | 9 3/8  | -3/8   | -3.8  |
| A POTTER INSTRUMENT  | 2-2   | 1 3/4  | 0      | 0.0   |
| O PRECISION INST.    | 2-2   | 1 1/2  | 0      | 0.0   |
| D QUANTOR CORP       | 3-5   | 3 1/8  | -1/8   | -3.8  |
| O RECOGNITION EQUIP  | 6-10  | 7 5/8  | +1/4   | +3.3  |
| O SCAN DATA          | 1-2   | 7/8    | -      | -6.7  |
| O STORAGE TECHNOLOGY | 10-19 | 18 1/4 | +1/8   | +0.6  |
| D T BAR INC          | 7-13  | 12 5/8 | +5/8   | +5.2  |
| D TALLY CORP.        | 4-6   | 4 1/4  | +3/4   | +21.4 |
| A TEC INC            | 7-10  | 7 3/8  | +1/2   | +7.2  |
| N TEKTRONIX INC      | 29-40 | 39 5/8 | +2 1/2 | +6.7  |
| N TELEX              | 2-3   | 2 5/8  | 0      | 0.0   |
| D WILTEK INC         | 1-1   | 5/8    | 0      | 0.0   |

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